

SUPPLEMENT.

The Mining Journal, RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

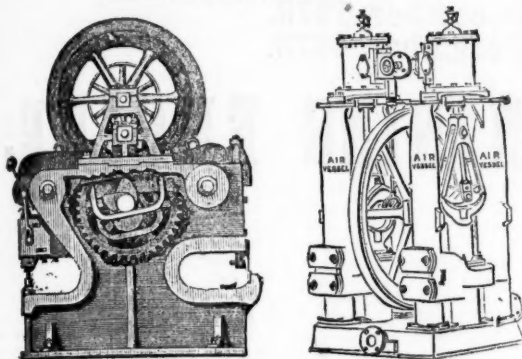
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LONDON, SATURDAY, SEPTEMBER 4, 1875.

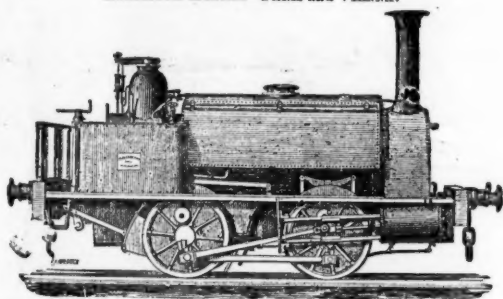
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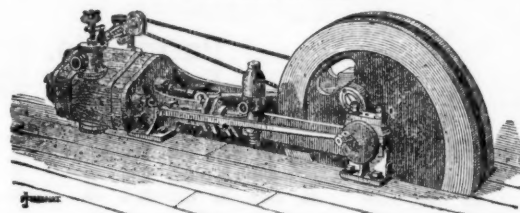
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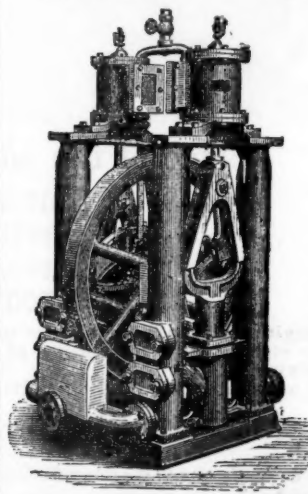
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"To this invention, which appears to possess several advantages over the machines previously exhibited at Falmouth, the Judges are unanimous in awarding a first-class silver medal" (the highest award).—*Report of the Judges at the Royal Cornwall Polytechnic Society's Exhibition, 1873.*

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"The simplest and best boring machine."—Capt. WASLEY's letter to the *Mining Journal*, Oct. 18, 1873.

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- 9.—The rotation is compulsory, and regular.
- 10.—40 lbs. pressure only is required to work it.
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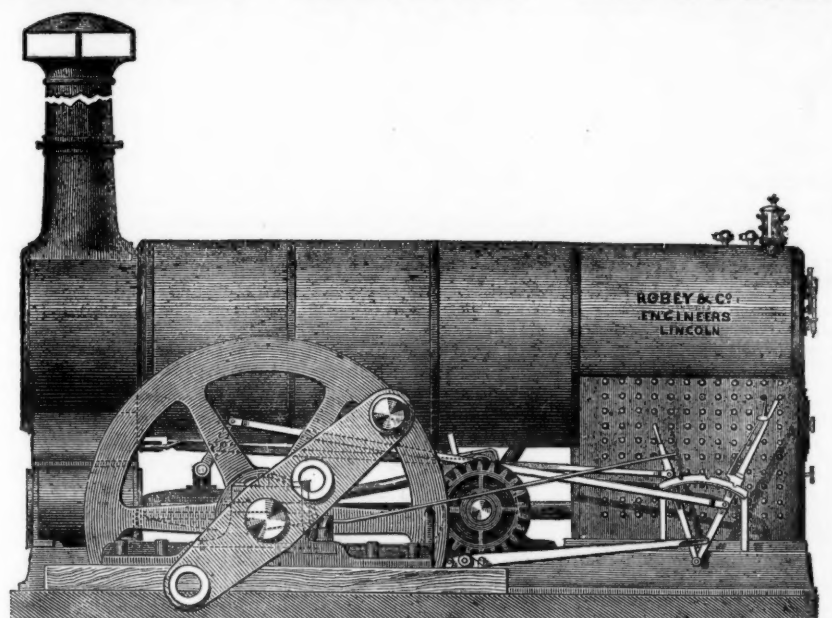
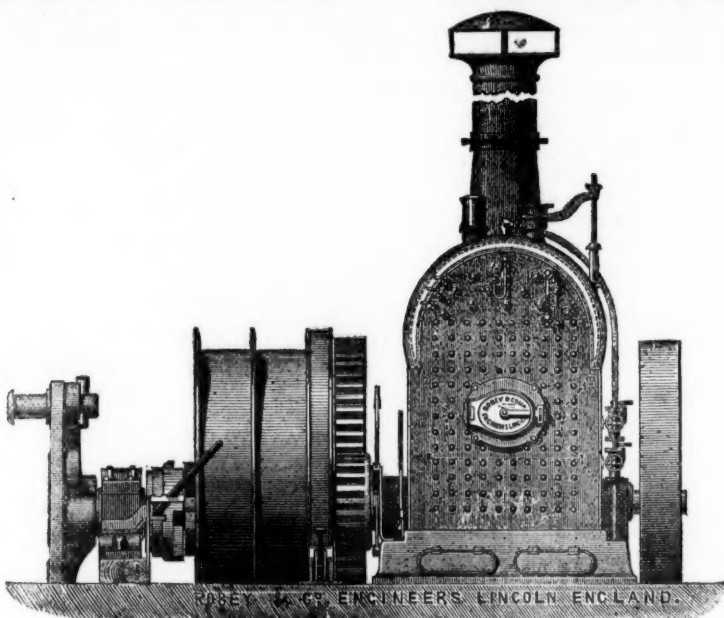
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Dated 16th December, 1873.

Patent No. 4150

Dated 17th December, 1873.

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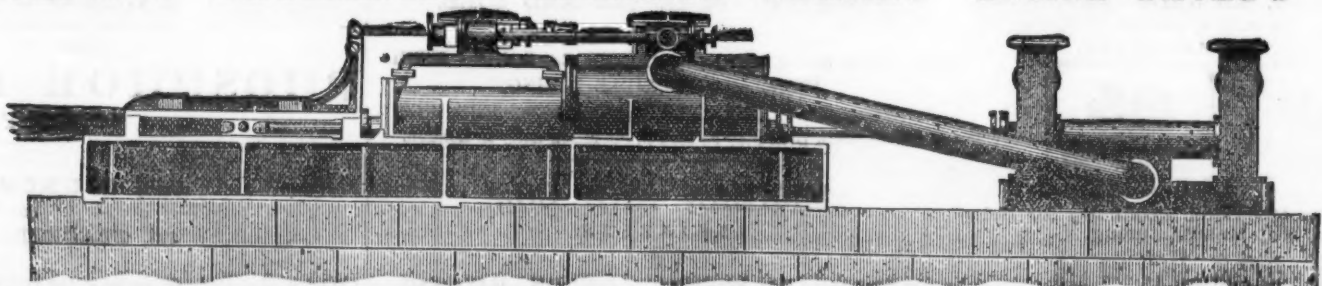
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FURTHER PARTICULARS ON APPLICATION

Original Correspondence.

COAL-CUTTING MACHINERY IN ENGLAND AND AMERICA.
THE "MONITOR" AND "PICK" MACHINES.

SIR.—I think I can reply to most of the statements contained in Mr. Firth's letter of July 14, by merely referring to either my original paper or my communication which appeared in your issue of July 8. My paper on the Monitor Coal-Cutter was read before the American Institute of Mining Engineers in May of last year, and in due course was published in the organ of the Institute, the Engineering and Mining Journal (New York), on Feb. 13 last, and, upon the motion of its American correspondent, the Mining Journal re-published it. I cannot recall that it contained any "fanciful claims of novelty or efficiency," but I do remember that due credit was given to the inventors of Great Britain for the progress they had already made in perfecting coal-cutting machinery. As published in the Engineering and Mining Journal, my paper and the accompanying sheet of illustrations gave the two items of weight and air-pressure, and their omission in the Mining Journal's reprint was an oversight on the part of the printer, and, of course, beyond my control. The air-pressure given at that time was from 25 lbs. to 30 lbs.; but since then, as set forth in my recent communication, it has been found that 20 lbs. initial pressure, or, cutting off at $\frac{2}{3}$ stroke, averaging 17 $\frac{1}{2}$ lbs., is ample, and the safety-valve on the air receiver is now adjusted so as to blow off at that pressure.

Mr. Firth appears to think that in England the difficulties attending mechanical coal mining have been surmounted, and that any improvement is out of the question. I, however, do not feel that the Monitor has by any means reached the limit of its capabilities; practice will, no doubt, suggest many improvements by which its present very satisfactory working may be excelled. It is true that in the body of my paper of May, 1874, the net result of 10 hours' work was given as 50 tons; but if Mr. Firth will look at the foot of that paper, as it appeared in the Engineering and Mining Journal, he will find the following:—Note. Since the above paper was read before the Institute some modifications in the description of the machine have been made in order that it may embody some recent improvements, by which improvements the capacity of the machine is brought to 80 tons for each 10-hour shift, and the durability of the cutter points so increased that one set will cut a 40-yard face. This note was appended just before publication, and, as will be noticed, eight months after the paper was presented to the American Institute of Mining Engineers, during which time, as stated in the note, many improvements were made, and the capacity increased. When progress of this kind is being made it would, of course, be impossible for the reports from the machine at different dates to agree; consequently, Mr. Firth's delicate little reproach for "attempting to distrust my own established quantity" does not apply, and he has my permission for its withdrawal. I certainly understood from Mr. Firth's statement that it required continuous working for the Pick to produce 100 tons in 10 hours; but, notwithstanding the fact that many of his arguments against the Monitor are based upon suppositions drawn from his imagination, I do not wish to use even an illiberal rendering of his own statement in working up a case against his invention, and am perfectly willing to accept any correction he may make, provided it be based upon actual practice, and not solely upon mathematics.

The question of air-pressure seems to be a stumbling-block in the way of "thrashing out" the Monitor, and, to get over it, Mr. Firth, in the first place, throws doubts upon the veracity of my statements, and persists in clinging to 25 lbs. average pressure after I have distinctly stated that 17 $\frac{1}{2}$ lbs. is now used, and then endeavours to explain away the high pressure required to drive the Pick by observing that its air supply travels through 9000 ft. of 2-in. pipe—a questionable piece of engineering, which I am surprised that with his experience he would recommend to any user of his machine; but, while the loss by friction is undoubtedly large, it is mere conjecture on his part, unless he has tested it with a gauge, that it reaches 25 per cent., and, as I have endeavoured to confine myself strictly to facts coming under my own observation, I cannot accept a guess of this kind as an argument. In this connection I would remind Mr. Firth that the air conveying pipe supplying the Pick in Monmouthshire was at the time of my visit 6 in. in diameter.

Having explained that large cylinders are used on the Monitor in order that low-pressure air might be employed, Mr. Firth now replies that everybody knows that, and in the same sentence asks why two cylinders are used; when I reply that a single cylinder engine without a fly-wheel often stops upon the centre I presume it will occur to him that after all everybody knows that too. These engines are driven 180 revolutions per minute, as I showed by the figures in my last, in order that with 17 $\frac{1}{2}$ lbs. average pressure they can be worked up to 13-68 horse power.

If the point I desired to illustrate by the knife and piece of coal is too obtuse for Mr. Firth's perception I will put it in another form, and say that a man whose limb requires amputation would much prefer an operation under the keen instruments of a skilful surgeon to having it shot off by a cannon-ball. This will also illustrate what I mean by "sheer weight of metal."

In designing the Monitor the weight was kept within that of a loaded pit-car (3500 lbs.), so that a mule could easily draw it through the mine; the weight (3400 lbs.) has never been found to be a disadvantage; on the contrary, the present style of machine works much more smoothly, and with less pitching about than those of earlier construction, weighing 1700 lbs. or 1800 lbs.

Mr. Firth's arguments that "the Pick has far less friction than the large cutting-wheel bedded into the coal," and that "the Pick weighs less than one-half, and withal channels out double the quantity of the heavy Monitor," should not be passed over without analysis. The Monitor's revolving cutting-rim (it is not a wheel) by its peculiar construction carries within it the supporting arm, and the width of the groove is, according to the set of the teeth, $\frac{1}{2}$ in. to $\frac{3}{4}$ in. greater than the thickness of the combined cutting-rim and arm; consequently there is no friction except at the keen cutting points, among six of which the width of the groove is distributed, whereas the swinging arm of the pick not only comes in contact with a great deal of loose coal in the groove, but channels out double the quantity of the Monitor. It requires very little mechanical skill to understand that if the Pick cuts a groove double the width of that cut by the Monitor, it must follow that double the friction (resistance) is met with, and, therefore, double the power required to overcome it. One of the important advantages of the Monitor is very forcibly shown here. I refer to the reduction to the minimum of the waste in mining. The difference between these two machines in this one item alone would in a year's operations represent a snug little sum in favour of the Monitor.

As I was drawn into this controversy against my own wishes, I shall be very glad to follow Mr. Firth's example and retire, leaving the merits of the respective systems of coal-cutting machinery to be decided by practical tests. Before closing, however, I desire for myself to acknowledge the courtesies extended by the Mining Journal during this discussion, which, although I have occasionally participated, I shall not hesitate to say has brought out a great deal of valuable information upon an interesting and important subject, which through ordinary channels would have been very different, if not impossible, to obtain.

Arch-street, Philadelphia, Aug. 16.

MINERS' SAFETY-LAMPS, AND LIGHTS.

SIR.—I think there is an error of some importance in the article on this subject in last week's Journal. It is said, "That Mr. Clanny invented a safety-lamp in 1813, which is now extensively used in mines." It is correct, I believe, that Mr. Clanny invented a lamp in 1813, which was taken into a mine at Rainton, and this lamp did not explode the gas, and this was supposed to be the first safety-lamp invented in Britain, but this lamp was of no practical use to the miner, as it gave out scarcely any light at all. It was a huge tin lantern; I have seen it many years ago, but cannot now describe it, but, perhaps, some of your readers can do so. The Davy lamp was next invented, and this was the greatest invention there can be

no doubt, although it is well known that this lamp is unsafe under certain conditions. The inventor of the great Davy has laid the foundation for all safety-lamps. "Billy Martin" next tried his hand, and he put a glass on the outside of the gauge to increase the safety. Stephenson next put a glass on the inside of the gauge, and certainly made a lucky hit. Next Clanny put a glass in the lower part and gauge above, and thus the present very useful Clanny lamp originated.—Newcastle, Sept. 1.

M. E.

BLASTING IN COAL PITS.

SIR.—It not unfrequently happens that a question is put in such a manner that to answer it affirmatively is altogether unjustifiable, whilst a negative reply would be construed as the expression of an opinion almost opposite to that entertained by the person questioned. This is precisely the nature of the question raised with regard to blasting in collieries. Everyone knows that the use of gunpowder in collieries causes loss of life, but everyone does not know whether its use should be prohibited. As many of the readers of the Mining Journal have had experience underground it would be well to state a parallel case existing at surface, and ask a parallel question upon it. As a matter of fact, the number of deaths caused by horses and vehicles or the drivers of them in the streets of London in each year is about 700—that is to say, five times as many deaths as result from the use of gunpowder in collieries. Now, upon the mere statement of the facts of the case the Inspectors are asked—"Is it desirable to prohibit the use of gunpowder in blasting coal in pits?" just as the aldermen of London might be asked—"Is it desirable to prohibit the use of horses and vehicles in the London streets?"

But there is this important difference. The Aldermen would know that as the public well understand the matter to be decided upon they might answer, No! but the Inspectors well knowing that not one in 10,000 has heard a shot fired underground are quite aware that they would bring the whole weight of public opinion against them if they said No, whilst all practical men would regard them as proper candidates for lunatic asylums if they said Yes. It is far more painful to an Inspector to have a death in his district than it is to the public, because he well knows that the public, being quite incompetent to judge, suppose that the casualties in a district are measured by the watchfulness of the Inspector, an erroneous notion which is frequently propagated through the ignorant and irritating scribbling of writers for the public press. One declares that a Plimsoll is wanted for colliers as well as sailors, a remark which suggests the idea that as that gentleman knows more about collieries than he does about ships, his maritime philanthropy having been awakened by a single attack of sea sickness, he might have acted more rationally had he kept his energies underground instead of trusting them to the nauseating influences of the ever-restless billows.

The suggestion in the Journal that "the system of prohibiting the use of explosives in any colliery, whether fiery or otherwise, should be tried," may well have excited the ire of Mr. Alexander, but most of the Inspectors are statesmen enough to know that the prohibition must be universal if anything. By all means let the matter have a trial, although I have no doubt that the result will be the re-introduction of explosives. It is beyond question that many of the most fiery mines, both in Yorkshire and South Wales, are conducted without blasting, which is worth mentioning, whilst explosions through blasting have frequently occurred in mines but little fiery. The challenge to prove that there would have been an explosion at Bunker's Hill had there been no blasting operations is a very safe one, upon the same principle that we may guarantee that a man will never be drowned if he never goes near water. The question to be discussed is whether the prohibition of blasting would add to the general safety of the mine, and to this question your correspondents would do well to give attention.

COLLIER.

Wigan, Sept. 1.

RUSSIAN SHEET-IRON.

The following letter has been addressed to the Editor of the Times:—

SIR.—The presence of the Duke of Edinburgh at the present great fair at Nischni Novgorod will probably recall to the minds of many English manufacturers and traders the nature of the goods collected there for disposal.

Among other transactions sheet-iron sales of magnitude are effected at those annual fairs. Russian sheet-iron has the reputation of being the best in the world, the points of excellence being toughness, ductility, and skin sleekness or glance. It is generally in great request, especially in the United States, where its good qualities bring it into favour for numerous bending and seaming requirements, which much of the sheet-iron of English make would not be equal to. The price of the Russian article is correspondingly higher.

In 1871 Dr. Percy published for the benefit of the sheet-iron and tin-plate manufacturers in this country a pamphlet* descriptive of the constitution and manufacture of Russian sheet-iron. Not the least valuable part of the pamphlet is the record of analyses, which shows that this so-called sheet-iron is really mild sheet-steel. This fact, coupled with the careful and efficient annealing effected before delivery, accounts for the toughness and ductility. Additional information upon the manufacture of this article was published in the early part of the Swedish "Jernkontorets Annaler" of this year.

Hitherto the tin-plate makers of this country appear not to have taken advantage of a branch of trade shown by Dr. Percy to be open to them. It is certainly worth their attention, especially in the present depressed state of their trade.

T. M.

Lydney, Aug. 30.

* "The Manufacture of Russian Sheet-Iron." JOHN MURRAY.

COPPER MINING ON LAKE SUPERIOR.

SIR.—In calling the attention of the readers of your valuable Journal last week I mentioned some of the dividend mines of Lake Superior, and the amount of assessments paid in to bring them to such a favourable condition—the Calumet and Hecla, Cliff, Quincy, and Quincy Mines. And now follows the Central Mine, which assessed to \$100,000, and rewarded its stockholders in \$550,000 in dividends, with not only their usual good appearance in the old mine for copper, but I am told upon good authority they have intersected the Calumet and Hecla lode on their location, which shows very rich. Pawabic Mining Company—assessments \$235,000, and paid out in dividends \$400,000. The National Mining Company called in in assessments \$110,000, to bring the mines to a paying point, and afterwards declared in dividends \$300,000. Of the following I give a recapitulation:—

	Dividends.	Assessments.	Profits.
Calumet and Hecla.....	\$4,800,000	\$ 800,000	\$4,000,000
Cliff Mine.....	2,280,000	110,000	2,170,000
Minnesota Mine.....	1,750,000	135,000	1,615,000
Quincy Mine.....	1,490,000	200,000	1,290,000
Central Mine.....	550,000	100,000	450,000
National Mine.....	300,000	110,000	190,000
Pawabic Mine.....	400,000	235,000	165,000
Total.....	\$11,570,000	\$1,691,000	\$9,879,000

The above table shows that the seven mines mentioned cleared a profit, over and above the assessments paid in, of \$9,879,000. Four of these mines are equally as rich in sight as at any former period—the Calumet and Hecla Consolidated, Cliff, Quincy, and Central Mine, while the National, with about \$20,000, could be placed upon a dividend list, if properly laid out; and the Minnesota is an excellent investment if taken hold of with good skill and economy. The Pawabic, by the underlie of the lode, seems to have almost reached its boundary line, and unless matters be arranged between this company and neighbours to go deeper, the company will soon have to fall back upon the upper levels, where they can, under the present able management, pay their way for years to come. There are two other mines here which have paid large amounts in dividends, but through misconduct in their outlay, they have been too severe upon the stockholders for assessments:—

	Assessments.	Dividends.	Lost.
Copper Falls Mine.....	\$510,000	\$100,000	\$410,000
Franklin Mine.....	370,000	240,000	130,000
Total.....	\$880,000	\$340,000	\$540,000

As I have already said of the different mines, too much funds have been carelessly launched out in various ways here in those two mines.

The Copper Falls, for instance, ought to have made profits for many years past, but I am pleased to say, however, its prospects are good under good energetic management, which the company richly deserves. The Franklin cannot be too highly spoken of, after so many years tantalisation, and then thrown open to tributaries, who almost made a total wreck of it. For the past 12 months, and for some time yet, the company will feel the smart of it. The prospects, however, fully justify any improvement the present management wish to make, and if there is any such a thing as bringing the dead to life, the Franklin is a similar case.

Allow me, next, to show your readers the product of the different mines, in the year 1872, on Lake Superior:—

Houghton County.	Tons	Keweenaw County.	Tons
Calumet and Hecla.....	9,718	Central Mine.....	503 $\frac{1}{2}$
Quincy Mine.....	1,402 $\frac{1}{2}$	Picnic.....	477
Franklin and Pawabic.....	680	Copper Falls.....	423 $\frac{1}{2}$
Houghton Mine.....	300	Delaware.....	110
Schoolcraft Mine.....	300	Cliff Mine.....	74 $\frac{1}{2}$
Isle Royal Mine.....	81	St. Clair Mine.....	13 $\frac{1}{2}$
Concord Mine.....	80	Petherick.....	6
Hancock Mine.....	28	Other sources.....	8
Other sources.....	6		
Total.....	Tons 12,543 $\frac{1}{2}$	Total.....	Tons 1916

Ontonagon district:—	Tons	Adventures Mine.....	Tons
National Mine.....	251 $\frac{1}{2}$	Aztec Mine.....	2 $\frac{1}{2}$
Ridge Mine.....	170	Victoria Mine.....	3
Minnesota Mine.....	1,99 $\frac{1}{2}$	Mass Mine.....	1 $\frac{1}{2}$
Flint Steel River Mine.....	37 $\frac{1}{2}$		
Bohemian Mine.....	38 $\frac{1}{2}$	Total.....	Tons 706 $\frac{1}{2}$
Rockland Mine.....	25 $\frac{1}{2}$		
Knowlton Mine.....	11 $\frac{1}{2}$		

Recapitulation.

Houghton County.....	Tons 12,543 $\frac{1}{2}$
Keweenaw.....	1,916
Ontonagon.....	706 $\frac{1}{2}$
Total.....	Tons 15,166

Next week I shall endeavour to lay before your readers the amount of mineral taken out on Lake Superior, from 1845 up to 1873, and in most cases the amount raised each year. Also the amount of ingot copper obtained from the mineral in question, and its value realised, and other matters which I trust will be of interest.

Portage Lake, Aug. 9.

A MINER.

EMMA SILVER MINING COMPANY.

SIR.—If it be true that our company is about to be reorganised, and that financial aid is about to be rendered by the original promoters, and that towards this end our late Chairman resigned his position? Surely no delay should be permitted in announcing this fact to the shareholders.—Stock Exchange, Sept. 1.

MEMBER.

AMERICAN MINES.

SIR.—Your interesting and timely short article in last week's Journal on "American Mines," with special reference to the Colorado Terrible Company, is open to a qualification which you will, perhaps, permit me to make. Some readers of the remarks might infer from them that there is uncertainty or insincerity in a United States mining patent, and that the Colorado Terrible Company might experience difficulty in maintaining possession of a property which has proved to be one of great intrinsic value. As a shareholder in that company, and tolerably well versed in the law relating to mining property in the United States, I have not the slightest fear as to the security of the tenure by which that property is held by the company. I have carefully perused a certified copy of the patent, and am satisfied that it is in every respect technically sound. When such a document is in proper form and duly issued the holder can have no more impregnable title to his property. The worst that can happen is to be subjected to attacks on the part of those who fancy that they can terrify the holder into paying blackmail, and the astute and not over-scrupulous citizens of the western States and Territories of the United States generally believe that an English company is fair game for operations of this kind. If the directors of the Colorado Terrible or of any other company were to hesitate about defending their rights they would soon find themselves the objects of innumerable attempts to extort money. Let the attack be vigorously resisted, as I believe, has occurred in the present case, and then the blackmailers will find that they have literally caught a Tartar. It is hardly necessary to add that no mine which is of little value has anything to dread from these Rob Roy's of the Far West. That Mr. Hamill has made the Colorado Terrible the object of his attack is a better testimony to the richness of the mine than the most glowing accounts of any mining expert.

Should the concluding remarks of the article meet the eyes of Mr. Hamill or his friends they may make them hesitate about continuing proceedings which will end in something worse than their own discomfiture. Until the shareholders in the Colorado Terrible are permitted to reap the fruits of such a prize as their property no holders of mining claims in Colorado need expect to persuade an English capitalist to buy them or furnish money wherewith to develop their properties. Considerations of this kind have considerable weight upon public opinion in the State of Colorado, and in that State public opinion may influence even the District Judge who should be inclined to think more about serving his political or personal friends than about administering justice. However, I, for one, am convinced that justice is obtainable in Colorado, and this is all the shareholders in the Terrible Company demand or desire.

Rolls Chambers, Chancery-lane, Sept. 1.

W. FRASER RAE.

PRESENTATION TO MR. J. G. GREEN IN PENNSYLVANIA.

SIR.—Would you please to allow me to publish an account of an enthusiastic meeting, which was held in this place, in your valuable Journal. The object of the meeting was to present Mr. James G. Green, of Aberystwith, with a handsome gold-headed cane, on his departure from this place to his native land. About four months ago he arrived at this mine to erect Mr. George Green's patent dressing machinery, a work which was completed successfully and satisfactorily on the 22nd inst. It was reported at the beginning of the week that Mr. Green intended to start for home on the 23rd inst. As he had the management of the mine "inside and outside," and had proved himself to be kind and courteous to all the employees, the men, not being willing to part with him without showing their esteem and goodwill, it was proposed that these sentiments should be made known by presenting Mr. Green with a handsome cane. The proposition was soon carried, as we had only three days to put the suggestion into effect. We went to work, and subscriptions were cheerfully given by all employed. On the above date the men were requested to be present in the evening at 7-30, at which time the presentation would take place. The room having been prepared to receive Mr. Green, a committee was sent to ask him to come to the mine, being directed, however, not to inform him as to the reason of the request. Whilst the committee were absent it was resolved that Mr. Henry Manley should preside over the meeting, and present the cane.

When Mr. Green arrived he was surprised at seeing the whole of the men assembled. Immediately on his arrival the Chairman "called the house to order," and then delivered a complimentary address to Mr. Green. He said that four months ago Mr. Green arrived at the mine a perfect stranger, and that he had, during his short sojourn among them, won their esteem and approbation, and that they now regretted to think he was going to leave them to-morrow morning. To prove our respect and goodwill towards him, he said, we have prepared a small present, which we hope you will accept from us as a token of our approbation and esteem of you. The cane now being uncovered, he said he had the honour of presenting that cane to him on behalf of the employees of the mine, in the hope that the small present would be a remembrance of that respect which existed among the men towards him. The Chairman hoped Mr. Green would again return and take the management of the mine; but if Providence should not so order it, he trusted they would meet again in another world, where partings and sorrows were unknown. He finally wished Mr. Green a pleasant voyage, and that he might arrive safe home to his wife and children, parents, and his numerous friends in Aberystwith.

The Chairman then read the inscription, which was as follows:—"Presented to James G. Green by the working men of Bamford Smelting Works, Lancaster County, Pa." The Chairman, after presenting the cane, took his seat. Mr. Green responded, and said he was taken by surprise, and that he could not then adequately express his feelings in words. He never expected anything of the kind, as he had merely, during his stay here, endeavoured to do justice between master and man. He thanked the men for the handsome present he had received, and should always look upon it with the warmest recollections as a token of respect shown him by the men of this mine. The ceremony of presentation being over, the following addressed the meeting:—Messrs. E. Jones (superintendent of the smelting works), T. Pierce, J. Whitehouse, D. Uren, Wm. F. Allison, while the undermentioned enlivened the gathering with songs:—Messrs. W. Brown, English song; A. Voor, French song; J. Style, English song; E. Jones, Welsh song; B. Keenan, Irish song; H. Bishop, English song; A. Martin, Scotch song; Adam Furney, French song; J. Peters, Dutch song; Frank Voor, Belgian song. Three cheers were given for Mr. James G. Green, with the wish that he might have a safe voyage, and three cheers were likewise given for his father, Mr. George Green, for his energy and perseverance in connection with the dressing of ore, and mining in general in Cardiganshire. Cheers were given also for Messrs. Bamford Brothers,

proprietors of the mine, and after thanking the Chairman for his services, the meeting terminated.
DAVID UREN, late of Penrhyncoch.
Bamford Smelting Works, Lancaster County, Pennsylvania, North America.

BLOW-PIPE SCALE FOR MEASURING THE WEIGHT OF GLOBULES OF SILVER OR GOLD.

SIR.—I do not, as a rule, think it advisable to notice anonymous correspondents; but, as the arguments and strictures contained in "Freiberger's" letter, appearing in the Supplement to last week's Journal, intended to prove my blow-pipe tables inaccurate, are, as I shall prove, based upon entirely wrong premises, and, therefore, worthless, I depart on this occasion from my usual practice, and reply to him.

In the first place, "Freiberger" erroneously imagines that the quantities in columns B and C of the scale should form a simple geometrical progression, and, finding my figures do not adapt themselves to this random guess, he, without thinking it necessary to inform himself of the true principle upon which they are constructed, rushes to the conclusion that the tables are inexact, and, therefore, unreliable. The very foundation of his argument being rotten, the tottering superstructure he has founded upon it necessarily falls to the ground. For "Freiberger's" information, I will explain that Tables B and C are calculated upon the mathematically correct principle that the volumes of homogeneous spheres are directly as the cubes of their diameters, and upon the further law that their weight is in direct proportion to their volumes. This being so, every result in the two columns from the 1st to the 50th degree required a separate and laborious calculation in accordance with a well-understood equation—

In the silver table (column B), $W = .47$ grains; and in the gold column (C), $W = 1.25$ grains.

If after testing my tables upon this basis, which I have faith to believe is mathematically sound, "Freiberger" (should it not be too much like Greek for him) finds my calculations unreliable, I shall then freely admit it.

Regarding the doubt he would cast on my judgment in advocating the blow-pipe, and his other objection that "the necessary minuteness of the scale causes it to give different results with different observers," I simply reply that if "Freiberger" will take the trouble to exercise sufficient care and judgment in placing the globule accurately upon the scale, employing a lens and the standard globule for comparison, it will be entirely his own want of skill if he fails. The scale and tables should not be blamed, for they are not intended for clumsy manipulation or bungling operators. While on this point I will ask "Freiberger" this question—did or did not the celebrated metallurgist and blow-pipist Plattner construct and use a similar scale to that I have given with which to estimate quantitatively the amount of silver or gold present in metallic ores or minerals? Now, Mr. "Freiberger" can you dispute this fact? Perhaps, however, you never even heard of the name of Plattner before, and are, therefore, in blissful ignorance of what has been and can be accomplished by the blow-pipe.

The absurdity of "Freiberger's" ridiculous comparison of the dowsing-rod with blow-pipe analysis cannot be better exposed than by giving the result of Plattner's great experience in his own language, as follows:—"The silver assay with the blow-pipe is one of the most important quantitative analyses that can be performed with this instrument. It affords the means not only of ascertaining the proportion of silver in any ore, mineral, or production of smelting-works, &c., but also of determining its quantity with sufficient accuracy." As regards gold, he says—"Its percentage in ores, minerals, furnace products, &c., may be ascertained with the greatest exactness."

"Freiberger's" remaining objections and observations being, like the rest, founded upon an entire ignorance and misconception of the principles upon which the scale is constructed and the calculations in the tables based do not require notice. As, however, an ounce of practice is worth a cart-load of theory and talk, I may be permitted to state that a globule of silver (one of those given as an example), measuring 9° upon the original scale, from which that in the Journal was taken, and corresponding by the scale and tables to a weight of .00274 grains, was transferred to a sensitive balance, which gave a weight of .00268 grains, being a difference of .00006 grains, or to within the six hundred thousandth part of a grain. Many people (excepting, perhaps, "Freiberger") would call this result even something more than approximate; nevertheless, if my paper, which appeared on Aug. 21, is referred to, it will be seen that I did not state absolutely correct results would be obtained, but a close approximation to the truth, and this I still maintain, with proper care and skill, can again be, because it already has been repeatedly accomplished. Of course, as public mining inspectors and assayers, neither Mr. Rickard nor myself would ever dream of giving a certificate upon a blow-pipe analysis alone, as your correspondent would imply. All I contend for is that whilst making remote mining inspections I have always found it of great service to be able *whilst actually on the spot* to obtain fairly approximate estimates of the quality and yield of certain ores, being thus assisted to a more correct knowledge of the intrinsic value and capabilities of metallic veins, and, therefore, in a position to report more accurately and confidently than if such an auxiliary as the blow-pipe were not at hand. Having said thus much, the discussion need not, so far as I am concerned, be further prolonged.

EDWARD GLEDHILL, M.E.

City Mining and Assay Offices, 3, Bloomfield-street, London Wall, Sept. 1.

A MINERALOGICAL SOCIETY.

SIR.—A notion is creeping noiselessly along amongst the people that the present state of mineralogical science is not exactly as it ought to be. Perhaps my ungainly prose in your columns, and elsewhere, may have helped to encourage the spread of this very naughty idea. I don't care if it has so done. How can I help sticking to what comes in my way? It is even hinted, as you are already aware, that a Mineralogical Society ought at once to be formed. Easier said than done it may be, but not by any means so difficult as it appears at first thought. The idea of a "glorious revolution" in mineralogy half inflates me. Very recently, less than a six-foot length of Webb has been made to cross from Dover to Calais; and a few such pulls in patient perseverance will presently cross the straits of mineralogy. *Nil desperandum.*

I like the notion so vastly that I am tempted to do a little more harmless mischief in furtherance thereof. You must know, Mr. Editor, that I have not done a long sum in simple addition for a good while, so yesterday (having finished fair-copying my Dictionary of Mineralogical Synonyms and dispatched it to London), by way of recreation I took to doing two or three rather long and tedious sums, and the following are what at school would be called the "totals." Prof. Dana's "System of Mineralogy" (1874) enumerates exactly 925 mineral species. (I tried to count the varieties, and "caved in.") The "Index of the Mineral Species, with their varieties, contained in the British Museum" (Jan. 1, 1875), gives the names of 690 mineral species, and 722 varieties. Comparing the latter work with the former, I find more than 200 discrepancies in nomenclature; and that our national collection contains 235 fewer mineral species than are catalogued in Dana's "Mineralogy."

Taking the more remotely-modern authors the discrepancies become largely increased. Also, I find "scattered up and down our unsatisfactory mineralogical literature," something like 1166 so-called mineral species, and about 1650 varieties. A goodly number of these have been automatically ignored by "the powers that be," albeit they were introduced to the world under the most respectable patronage of the time being. I have shown in previous communications that very many of these so-called mineral species are of extremely doubtful character, and that certain of them appear to be rank impostors.

Some of the questions that naturally arise out of these simple statistics are: 1.—How is it (in what ought to approximate to an exact science) there are so many discrepancies in its nomenclature? 2.—How is it that our national collection lags so very far behind in the acquisition of authenticated mineral species? 3.—Whether the points upon which the two great authorities are agreed are, in themselves, altogether appropriate (and, therefore, to be fixed upon forever); whether points on which they differ are irreconcilable; and,

whether some other authorities outside the enchanted circle, and differing from both the autocrats, may not be taken as equally reliable? 4.—Whether, and how it is possible to change a state of things which is at last admitted on all sides to be a disgraceful hindrance to the advancement of science?

Now, Sir, having pointed out the diagnostic symptoms, it remains to find a remedy for the disease, or, rather, for this complication of disorders. You will not be surprised if I advocate an antiseptic treatment in the first instance, for it will at once arrest the growth of the disease-germs, and tend to calm the suffering patients. Besides, you know very well how the good (Cloyne) Bishop Berkeley, 131 years ago, wrote eloquently of the "virtues of tar-water, and divers other subjects connected together and arising one from another;" so that it may be within the bounds of possibility that Tar may be antidotal even now as regards the mineralogical subjects arising out of one another which have got into such an uncomfortable state of disorder. What next? I hear you say. Apply warm stimulants to exertion in the formation of an independent society of men (and women, also, if they have a mind to) whose avocations and likings are more or less in accord with the study of inorganic substances. This is, I think, the remedy for the ills that mineralogical science has unfortunately inherited.

Once upon a time, in the good old days of "the four elements," somewhere a little before the year one, it appears there really was a "British Mineralogical Society," and my friend Mr. Rudler, in the *Chemical News* of August 20, tells us what became of it—namely, that it got merged into the *Askesian Society*, in Plough-court! All honour to the names of Allen, Pepys, Tilloch, Knight, and Lowrey, the founders of it. Ploughmen most worthy of imitation. These daring adventurers pluckily undertook to make mineralogical bricks almost without straw. Adventurers of the sort of to-day will find themselves bothered, at the first, with a superabundance of straw, which will have to be stacked out of the way, a good deal of it, so as not to impede progress.

A new mineralogical society should be easily possible. It must be cosmopolitan, and may be very inexpensive; a yearly fee of a guinea for membership would amply suffice to work the thing thoroughly. I have seen sundry signs of adhesion to the movement, and the feeling must necessarily grow. It may be asked, as of old time, "Have any of the rulers believed?" It may be answered, hesitatingly, that possibly some of them have. In the mineralogical world the greater lights have been ruling its day. It has now become night, and the turn of the lesser lights has come. All are not lunatics who walk in moonlight. All are not Solons who walk in sunlight.

It is said, "Facts are stubborn things." The facts I have given above point plainly to the desirability of forthwith empanelling a sort of Grand Jury, who shall well and truly try these curious and important questions, and others that will plentifully arise one out of another. This is, most happily, almost a free country. A man may say, write, or do anything he likes that is within the shadow of the law. Errors of high intellect may be freely criticised without impertinence; and, on the other hand, even a little *gaol* may not be run down by a *royal yacht* without judicial enquiry following as a matter of course. The last proud fact is one that astonishes our continental neighbours. Just so are we free to sit in judgment upon the works of our mineralogical popes; and you may rest assured that their faith will follow close upon the heels of independent and intelligent investigations. We shall see, what we shall see, and if you, Sir, will obligingly add a footnote to this, to the effect that memoranda of adhesion to this new idea, addressed "Mineralogical Society," may be sent to your office, some good will certainly come of it, and that very speedily.

T. A. R.

Liverpool, Aug. 31.

[The Editor will have much pleasure in forwarding to "T. A. R." any communications which may be addressed to "Mineralogical Society," and if such an institution could induce mineralogists to give more attention to the general chemical constituents of minerals, so as to reduce the number of species, instead of following the present system of indefinite multiplication of species by the servile attention to crystallography—differences of crystallisation being frequently due only to the conditions under which it takes place—a benefit will be conferred upon science which will entitle "T. A. R." to the warmest thanks of all classes.]

THE DOWSING ROD.

SIR.—In the Supplement to last week's Journal I notice that some of your correspondents are very much "riled" at the opinions embodied in a previous letter of mine. Mr. Tregay seems to forget that all letters for publication are addressed to the Editor, and as I have sent my card as a guarantee I fail to see how Mr. Tregay makes out his case; besides this, we are not dealing with the matter in a legal way, but in a practical, and this makes a wide difference. There appears to be a sort of maudlin indistinctness in what he says of Mr. R. Symon's statements, which precludes the possibility of remark on that head. Will Mr. Tregay be good enough to explain what he means to convey by the statement, or conjecture, "There may be in London, as in other places, gentlemen and gentlemen," and what this has to do with the question at issue—the dowsing rod?

Mr. Tregay appears to be unaware that theory adduced by logical reasoning may not be true—his ignorance suggests a proverb which expresses the impropriety of enlightening ignorance when it is accompanied by conceit. Having attempted to demonstrate no new theory as to the growth of plants, but simply to state the most common facts in relation to plants, my object was to expose some of Mr. Tregay's most unwarrantable and prejudiced statements, and this object I have accomplished. Although pretty familiar with Virgil, I was not previously aware that that author had a knowledge of the gases which build up plants.

In his last paragraph Mr. Tregay adopts a tone of strong irony. Inasmuch as my letter simply mentions the fact that spiritualism is shown as a palpable imposture at the Crystal Palace by Maskelyne and Cook, I fail to see who or what his irony is so cuttishly (?) antagonistic to. In this fact Mr. Tregay has discovered an argument. Well, perhaps he is right, for what is stronger than plain, unadorned fact?

My former letter showed how I arrive at the conclusion that the motion of the dowsing rod is caused by muscular force—involuntary though it may be. Numerous instances might be given of this in the many pet mysteries of this wonder-loving world. For instance, that little curious machine (the name I forget just now) which excited so much wonder a year or two ago. A thin flat piece of wood running on three ivory wheels, with a pencil affixed, became a magical go-cart, for on a hand being placed on it, and a question asked, it at once moved up and down, so that the pencil wrote an appropriate answer, and it was supposed a true one, although the operator did not wittingly move a muscle. Those who were sceptical pronounced the effect to be owing to involuntary muscular action, and the idea has been exploded. What is still more extraordinary, the men who made these machines believed that there really was some mysterious agency connected with them. We believe the time is not far distant when, like this, the dowsing rod and all sister notions shall be remembered only to wonder at the credulity of the British in the fourth quarter of the nineteenth century.

Seldom has a weaker attempt at a thoughtful and sensible letter been made than that which was signed "Fair Play" last week. He first apologises for writing, his apology filling paragraph No. 1; No. 2 is a preamble of length, which only announces what "N. B." said, and what "Fair Play" is about to say. Then he asks, in a tone of exclamatory interrogation—"What reply shall I make? What answer shall I give?" If he had not decided, then he would have done better to make no answer. He opines that there may be many things in heaven and earth than is (are) dreamt of even in "N. B.'s" "little philosophy." Now, whilst leaving "things in heaven" to the clergy, I may state that I am not in the habit of dreaming of philosophy, and that I know just as much of the secrets of Nature as "Fair Play," or anyone else also. The letter bears

* I wonder how many amongst us know how many elements there now are?

the impress of the visionary bigot so strongly that it is not worth while attempting to confute many of his remarks, and if "Fair Play" is not the author of "Jacob's Rod" he writes very much like him. I am not desirous of "challenging" such a redoubtable champion (as Mr. Welton is in the estimation of "Fair Play") and thereby advertising "Jacob's Rod" gratuitously. Far from my statement as to the dowsing rod dip being a question of muscular action being a mean one, it is founded on the opinions of anatomists, and those who have given the human frame and muscular action the closest attention.—Sept. 1.

N. B.

THE DOWSING ROD.

SIR.—Not having read the Journal for some months I have only accidentally come across the recent correspondence in your columns on the subject of the Dowsing Rod, and I am sorry to have missed it, for I should have been able to answer the queries of many of your correspondents, who seem, for the most part, very much in the dark on the subject, with the exception of your Cornish correspondent, who hails from Redruth, and who has evidently studied the antiquities of the subject, with considerable industry, but with less success than if he had had access to the British Museum and other repositories of works on the occult sciences. I think that no one seems to have the faintest idea what overwhelming evidence exists in favour of the practical utility of the dowsing rod, and still less of the results of the most industrious scientific investigation of its properties which was ever placed on record by a recognised man of science, a member of all the learned societies of his day. I refer to a rare French work by the Count de Tristan, published half-a-century ago, but which I have not at hand to refer to, as I lent it some time ago, with a number of other works on the subject, to an eminent viewer of mines in County Durham, who expressed great interest in the subject. I may say that my studies of the occult sciences first introduced the subject to my notice. I had come across friends who had seen it used, and testified to the results being absolutely satisfactory, but I had never come across a dowsing myself, nor had I any idea that I possessed the faculty of dowsing when I first discovered the literature of the subject, which is very extensive and very interesting, and, to unprejudiced minds, quite conclusive. The old occult philosophers were no fools. They knew a great many obscure facts in nature which their neighbours ignored, or regarded with superstitious feeling as connected with bedevilment, and consequently the few savants who were superior to ecclesiastical prejudices were obliged to disguise their researches and their discoveries in all sorts of obscure language and by all sorts of symbolism which was caviare to the multitude, to avoid the peril of being prosecuted as wizards and warlocks. Not that there is no truth in witchcraft and magic, and such like antiquated "superstitions." They are all founded on fact and not on fiction, and when the records of our old witchcraft trials come to be critically investigated by such men as the six fellows of the Royal Society who have recently testified to the truth of the phenomena of modern Spiritualism, and the reality of the power of communicating with the inhabitants of the unseen world around us, it will be found that numbers of innocent men, women, and children were cruelly burnt and tortured to death by our forefathers, for no other reason than that Nature had made them mediums, such as Herne and Williams, and the numberless mediums whose advertisements now crowd the pages of the "Medium" and other periodicals devoted to pneumatology, and who are no longer obliged to hide themselves in dark corners, because they are admitted to Belgravia society in Belgravia drawing-rooms, where they find numbers of the upper ten thousand endowed with the same marvellous and exceptional faculties as themselves.

But this is a digression, and regard for your space forbids me to travel out of my record. It was in investigating the science of animal magnetism and pneumatology that I came across the literature of dowsing, and when I had found and mastered Count Tristan's laborious work I had no longer any doubt that the dowsing rod was a very delicate magnetoscope, or, may be, electrometer, of Nature's own manufacture, and that a diligent investigator following in the tracks of the French savant might hope to rival Faraday in the brilliancy of his discoveries. De Vallemont had preceded Tristan by a couple of centuries, and his work contains abundant evidence that he too had fathomed the mystery, and knew that it was an electromagnetic action on the delicate instrument which caused the marvellous results, and which constantly breaks the rod short off in the hands of a sensitive dowsing. All dowsers must be sensitive—that is, people of a very delicate nerve-organisation—or they will not be able to communicate the peculiar animal magnetism to the rod which, when it is brought in contact with the electro-magnetic currents flowing through the dowsing from the minerals in the earth and concentrated by the rod, causes such energetic action. I could fill many of your pages with my own personal experience, and many more with the data I have collected, and I think as many more with disquisitions on the philosophy of the subject, but I forbear. I hope one of these days to be able to publish all I know, and to be able, ere then, to follow up Count Tristan's investigations to some useful practical results. Meanwhile, let me tell a condensed tale.

I was advised by a great metallurgist to take up a mineral lease, and I followed his advice, and negotiated for the lease of an extensive mineral manor in a mining district; on obtaining it I sent a local mineral agent over the property to report on the mineral—he reported adversely. There were, he said, a few lodes and veins which crossed the valley of no great account, and he evidently did not know where, for he pencilled several on my map where none existed, and the only one which was proved by mining operations, then in progress on the opposite side of the valley, he laid down in an absurdly wrong direction, for he connected it with the only pit which had been opened on an apparently small lode on my side of the valley, and which eventually proved to be an independent lode of great value coming from quite a different direction. His report scared me, and almost made me throw up the lease, but I thought it better to use my own eyes and exercise my own judgment, so after awhile I came down myself, and enquired what was known of the minerals by the inhabitants of the valley. I was recommended to a debauched old drunkard, who had lived in it all his life, and professed to know all that explorers had ever discovered in it, and I found that my industrious surveyor had enlisted him in his service, and had spent half-a-day in his company, and then made me the discreditable report in question, for which he charged me ten guineas. I afterwards told him I thought the time would come when he would be glad to give me 100 guineas to burn it, so little was it likely to be deemed to his credit.

I spent three days in the company of my confident guide with my results worth speaking of. His knowledge was not comestable, if he had any, and his available experience was quite worthless, and the tract I had to go over was so large that it would have taken a month to make a minute survey sufficient to detect the surface indications of mineral that did exist. In despair I bethought me of the dowsing rod, and wished I had the power of using it; and hearing that some South Country miners were employed in a neighbouring mine, I went to it and enquired diligently for a dowsing. I was fortunate enough to find one, and drew him, as a fox terrier would draw a fox, for he was very reluctant to confess his gifts, or to allow them to be exhibited in public. But he yielded to my urgency, and accompanied me. We cut a supply of rods, and I thought I would see if I could succeed myself in using one, and to my surprise and delight I found that the rod would work as energetically in my hands as in his, and so I was able to test his results. In half-a-hour we had found three lodes, one of them the powerful lode on which he was himself at work, and we tracked it and laid its course down for a couple of miles across my manor, the evidence of the rods being supported by the surface indications to which they led us. But we had a pickaxe with us, and we did not trust to our rods alone, we put in the pick where they gave the indications in suitable ground, and were rewarded by digging up bedmatte at our first attempt in a spot where there were no surface indications at all—in point of fact, we had to cut away some gorse bushes to put the pick in at the river side, for the rod had worked on a well-trodden footpath, 20 ft. above the river. This was conclusive to me, independently of my own sensations, but we worked on for three days, mapped a large number of lodes, all previously

unknown, and I had the satisfaction of having our map of them endorsed, in every single instance, by the geologists employed on the Government Geological Survey of the county shortly afterwards, for I thought it better to get scientific evidence in support of my own conclusions. Not one single fact was added by these geologists to the data I had myself supplied, except some interesting observations on the character of the granitic and Silurian rocks of no practical value, but it was a triumph for the dowsers and their rods.

Since then I have taken my dowsing with me to survey the extensive estates of an Irish friend of mine, in a county where no mine had ever been opened in the memory of man. His forester, at first incredulous, yielded to the logic of facts, for he proved he could use the rod himself as well as we could, and we discovered and mapped in two months 150 lodes, master lodes I should say, never booked one which we did not all three independently discover and acknowledge, and I doubt if any Irish landlord possesses so truthful and valuable a map of his underground wealth as we left my friend, several members of whose family proved to be as well able to use the rod and bear independent testimony to the accuracy of our discoveries. I got him over some English miners to open a few of his lodes, and the miners were all well satisfied with the indications of mineral, and the mine water flowed out richly stained with mineral, and I have every hope that ere long the development of a new and valuable mineral district will be recognised as due to the practical use of the dowsing rod, and to the practical good sense of a member of Parliament, who had the courage to ignore the senseless scepticism of the idiots who—generally in deference to mischievous ecclesiastical prejudices—scoff at facts which they have never investigated, or of which they are utterly ignorant, and venture to brand practical investigations into the occult sciences as credulous and superstitious. People forget that superstition consists in disbelieving facts quite as much as in believing fictions. In conclusion, I will only say that I will undertake to map the lode, in any mine sett or mineral district against any mining surveyor in the kingdom who ignores the science of animal and mineral magnetism, and the use of Nature's delicate electro-magnetoscope, the dowsing rod.

Aug. 31.
P.S.—I may say I have never sunk a pit on the indications of the rod without coming on ore, and that my dowsing has never used the rod to find water, for fear the indications might confuse him in his quest of minerals; but it should be remembered that almost all mineral lodes are more or less water-courses. I shall be happy to answer any enquiry made by people who love truth, and despise vulgar prejudices, which are so antagonistic to the elucidation of truth.

THE DIVINING ROD—"DOWSING."

Sir,—I like to see a ventilation, through the Journal, of the subject above named. There are many persons who will never believe a doctrine unless it can be fully explained and comprehended by their understanding, although there are many processes in nature which they know, but the mode or manner of which they cannot understand. Now, it may be that it is true that lodes, &c., can be found through the instrumentality of the rod, when used by an accustomed hand.

A gentleman, just returned from Spain, was in Cornwall last week. He came down to seek after copper mines, not hitherto worked very extensively—certainly not such mines as Clifford Amalgamated, &c. He prefers virgin ground, and I accompanied him over some lands in a celebrated mining district, where I suppose lodes exist, but which have not been "cut." I sketched out three sets for him; and he intends to search after copper in each of them. We saw a miner on one of the sets, with whom we entered into conversation as to the chances of finding mineral there. He asked him if he could find lodes by "dowsing"? He said that he could, having done so many times, as many others have done. He is confident of being able to find lodes by the rod, wherever they exist. My friend, who was previously rather sceptical as to the discovering virtue of the rod, is convinced of the propriety of testing the same by employing the man to search for lodes in the sets, immediately after the "tack-notes" are procured. After the man has gone over the ground, and the result, whether for or against the "science," is known, you may expect to hear again from, R. SYMONS, Truro, Sept. 1.

THE DIVINING ROD.

Sir,—The discussions in your columns on this subject are more amusing than instructive, but happily they are useful in the latter sense also, as they show to what extent human folly and weakness can go. Can anyone point out a lode of metals or a deposit of minerals to the discovery of which the divining rod has ever conducted the explorers, or rather experimentalists? Which of all the great mines in Cornwall, Devon, Cardigan, the Isle of Man, Ireland, or elsewhere, has been discovered by this mysterious walking-stick? If it is as potent as it is funny, why is not the untired ground of Cornwall and Wales opened up, replete with treasures as it is? The late Captain Francis used to say, half in seriousness, and half in badinage, that he believed lead was under the whole soil of Cardigan, and extended to London, if we could only go deep enough to get at it. His bit of humour suggests the query how deep will the indications of the divining rod penetrate? Possibly to the Antipodes! We wonder in what precise portion of the territories of the Maories might we find a gold deposit by a divining rod of decent power and skilful application being pointed in Cornwall.

What is it? Some of your correspondents maintain that the phenomenon is physical—the fashionable explanation now-a-days for the inexplicable and the nonsensical, when flouted about by the impracticable and unphilosophical. Mesmerism, biology, witchcraft, have all been brought into requisition to account for this freak of human eccentricity, and most of its abettors are at a loss to which to attribute it; or as in chemistry, according to good old Dr. Dalton, atoms in different proportions produce exceedingly different substances. Perhaps some of the physical philosophers and quasi mineralogists will tell us what proportions of all these alleged causes will produce the alleged effects.

"His notions fitted things so well,
That which was which he could not tell."
What is the origin of this marvellous division? Can it be possible that the old Jews who in the days of Elijah chafered for tin with the Phœnicians on the quays of Marazion slipped away, leaving Aaron's rod somewhere about the foot of St. Michael's Mount? I should be more disposed to think that it is a lineal descendant of one of the rods of the Magi, but Aaron's rod ate them all up. We commonly speak of people affected in a particular way as "wool-gathering," but tin gathering will now do quite as well for the diviners. The Rev. Mr. Spurgeon once said of Spiritualism—"It would be a foolish loss of time to reason against it; it must be put down by ridicule." The language is sagacious, and applicable in the present case.

What, then, Mr. Editor, is the rationale of these divining rod proceedings, and of their supposed connections with what Mr. Sergeant Cox and Mr. W. Crookes, F.R.S., calls the new physical force, a phrase which the divining rod doctors have picked up, and are using without understanding it? We think the solution of this question may be found in the words of the late Sir Henry Holland, "The phantoms of mesmerism, and the still worse follies in frauds of spirit rapping and clairvoyance, often wrapped in the phraseology of real science, may deceive not only the many credulous of the world, but even some men who in other matters can justly appreciate the evidence of truth. Such incongruities of belief belong to every age, but the counterfeit never gets the last stamp of the genuine coin. The followers of those fancies are prone to pass from one to another, allured by novel and more mysterious pretensions. It is a matter of mental temperament, and, after considerable experience of life, I generally find myself able to indicate the persons most liable to be deluded. Of these mockeries of science the greatest part are of foreign origin, and the most recent are the most preposterous. Happily, the progress of real knowledge is little liable to be retarded by such vagaries, which speedily efface one another; each is destroyed in turn by the same credulity which begot it." Jealous for the honour of scientific mining and scientific miners,

and especially in the grand old county of Cornwall, I invite your readers to apply to the apostles of the divining rod the words of Sir Henry Holland.

THOMAS SPARGO.

THE NASCENT COPPER PROCESS.

Sir,—And once again we meet, after an absence on my part of many weary months, extreme ill health, hope deferred, and bitter chagrins have prostrated and almost made defunct your old correspondent; but for Auld Lang Syne pray accept a few impassioned lines from one who has always been, now is, and ever will be sincere in all his written addresses to the public, which, although poorly clad in the garb of eloquence, not a whit the less will forth from the innermost recesses of this heart. Nay! why should a few of your churlish sceptical readers be so unkind in their premature judgments which are expressed in their very visages and thoughts? Indeed, I am no actor, save in the sense of one of our greatest bards, who proclaims "All the world to be a stage, and every man an actor." Verily this is stern truth itself, and with 12 months' reflective experience behind the scenes, witnessing the several great magnates or stars in their respective roles of the deepest tragedy to the lightest comedy, what a tale could I unfold! But shall I? Mayhap better not; however, it is now high time to relinquish my menial capacity behind the stage, and bring forward an unrehearsed tableau or *dénouement*, by pulling the strings, shifting the scenes, and getting rid of the deputy supernumerary actors, who can only lay pretensions to deficiency in their parts, and are too conceited and foolish to be taught or prompted.

I notice in your columns of last week a letter emanating from Mr. C. W. Adams, of Colorado, respecting the Nascent Copper Process, which is the part property of, and originally was patented by, the humble servant of your readers. I shall leave others to respond to Mr. Adams, and meanwhile beg permission to furnish an abbreviated tale, founded on real facts, which will have much to do with the future history and welfare of English mining.

Once upon a time there existed a well-known firm, trading under the name of Emmens Brothers and Co., represented by Dr. Emmens, a gentleman of great intellect, integrity, and perseverance, with some faults, many virtues, and more brains than any ordinary half-a-dozen mining men, throwing the writer into the scale as make-weight. Well, only 12 months since this popular firm was scattering the coin of the realm broadcast throughout the mineral districts of Devon and Cornwall; all was as merry as a marriage bell, a brilliant future looming through the horizon, and even the few gloomy clouds which are almost always observant in the brightest dawn of day, were interspersed, both practically as well as figuratively, with the silver lining which accompanies them in the back ground. In a word, the firm was in the zenith of its glory, with purse well laden, and equally as bountiful, credit unlimited, the Callington district being especially visited with the sunny smiles of Fortune's favourites. But, alas! a dream, as it were, a mere span of time, has converted the smiles into frowns, and nought but a halo of romance, shaded or delicately tinged with liabilities to the tune of nearly a quarter of a million sterling, now appears as a remnant upon the scene of all that was once bright and prosperous.

Surely there must be some cogent reason for such a change, some explanation of such a remarkable phenomenon. Indeed there is, and the following will impart a true and correct version:—After the tens of thousands—aye, hundreds of thousands—of pounds expended round and about Callington as a crucial test in the profitable search for rich minerals, it would be worse than manical for anyone to attempt to provide capital for the development of Holmush, Kelly Bray, and Redmoor without having a special and novel object in view. That Dr. E. had his plans well matured I happen to know, for oft and again together we have discussed the means and ways to promulgate a grand commercial success, based upon the profitable treatment of the lowest of low-class ores, which ended in my being made last summer general manager of the whole of the "Emmens United Mines," with *carte blanche* to erect works at Redmoor for the express purpose of returning 2000*l.* per month from unsaleable low-class ores. We need not go into particulars as to zeal displayed and impetus given to the agents by the simple raising of their salaries 50 per cent.; suffice it to say the works were erected speedily, quietly, and without any ostentation under my plans, with the exception of the round furnaces, with which I had nothing to do.

Now comes the great secret. The innings of this writer was indeed brief, exactly two months. Callingtonians, one and all, especially the heart-broken creditors, can endorse these statements. Intense excitement prevailed just before the starting of the works; success was never entertained, as a matter of doubt, but acknowledged only as a positive certainty, when human nature, with the cloven foot, steps in and overreaches itself by not only being dissatisfied with the whole of the anticipated or coveted wealth, but actually desiring to rob one who held no pecuniary interest, but had laboured hard and long, and suffered much in the good cause of the very honour which would have followed a genuine success. Yes; the writer was ignominiously ousted (against the desire of Dr. Emmens) by some sleeping partner or lay member of the firm of Emmens Brothers and Co., who had suddenly conceived the flight of fancy to superintend the works himself, reside upon the mine, and enjoy the profound sensation of coining money and winning glory by gathering figs from thistles, or more practically, turning beggary into wealth. With trumpets also and shawms was the *Lay* member heralded a veritable Commander of the Bath, credentials surely sufficient to scientifically administer the senatorship of the lixiviating tanks, who, with his favoured satellites, intended to work miracles, and throw even "Barnardian Rhapsodies" into the shade, forgetting at the time that the lowest round of the ladder, then occupied by the luckless one, was safer than the highest, and that jubilant chuckles, pretensions, and flourishes emanating from an exalted personage were neither an acquisition nor a requisition, when we bear in mind the significant principle that the sun has no need to boast of his brightness, nor the moon her effulgence.

The interference displayed by Mr. Lay I consider administered the death warrant to Emmens Brothers and Co., and a few plain facts and figures will prove the assertion. Rumour says that I am credited with the downfall for erecting such extensive works at Redmoor. What folly! The cost amounted to less than 1500*l.*, and was the main spring of the whole affair; but suppose we endeavour to cull some information respecting these works, which were and still are the pioneer of successful English mining. Here's the note! Where is the 2000*l.* per month? Echo answers, Where? Never mind the echo, but what do the agents respond? more particularly Captain Knott, who, since Mr. Lay threw down the sponge, has attended to the Nascent Copper Process.

A few historical records of what has transpired this past 12 months—indeed, the log book or diary of Redmoor—would be very interesting. Unfortunately it is not in my possession; however, the general proceedings have not escaped the notice of your correspondent, which shall be briefly enunciated. That copper and silver precipitate, to the tune of 2000*l.* per month, has not been returned is conclusive, still from first to last the average is 200*l.* per month, and it has been within the bounds of possibilities and all probabilities for the promised 2000*l.* to have by this time increased to 5000*l.*, instead of decreasing to a paltry 200*l.* What about last winter, when Dr. Emmens was spending with indomitable pluck his last thousands? What, indeed. Why, simply this. The ores under treatment could not be effectually chloridised in the furnaces within 24 to 48 hours. Whole armies of masons were engaged to erect fresh stacks of flux and furnaces; money was then no object, but all to no purpose, and the C.B., discomfited, finding that his dream of life was over, withdrew from the scene, crest fallen with his sleeveless errand.

This was virtually proving the Nascent Copper Process to be of no value, but eventually improvements were made with the draught, &c., still for a special purpose. I paid the Redmoor Works a visit some weeks since, and gathered from Capt. Knott that it takes 16 hours to chloridise the ores, and that nothing under 2 to 3 per cent. of copper ore can be worked to good profit. The enormous piles of ashes, the residuum of arsenical ores, lying at the West of England Works and Kelly Bray, which give only 1*l.* per cent. copper, and 4 ozs. silver, are now accounted for. A true confession rendered and endorsed that they are of no commercial value, even by the aid

of the Nascent Process. The very knowledge of the lesson required promptly acquired; and without foolish conceit or egotism I now emphatically assert that my patent for "economically and effectually chloridising low-class ores" will do as much for us, as has hitherto been done for 5*l.*, which means that 1 per cent. ores with its use are better than 3 per cent. without it.

Your readers need not imagine that if my services had been retained with Emmens Brothers and Co. no disasters would have happened; far from it. The system of chloridising has always been an arrant failure; therefore, the same enchanted hash to a certain extent might have formed one of the courses, but at least manly vigorous efforts and every scheme would have been made and tried to win success, especially when so much was at stake; but let deeds and not words speak, for although removed from the scene of activity and stricken down with illness, I have not been utterly idle, and can furnish and erect a patented furnace for 100*l.*, which will effectually chloridise 15 tons of ore per day of 24 hours with 15 cwts. coal, rather a slight contrast to what has hitherto been achieved.

Summary: The works at Redmoor are now treating about 2 tons per day, and can earn an income of some 200*l.* per month; the furnaces have only to be altered at a total cost of 500*l.*, including several additional tanks, and I will guarantee to operate upon 50 tons per day. Messrs. Emmens Brothers and Co. have over 2000*l.* of my money locked up, which will never realise a threepenny bit in 1*l.*, unless the whole of the creditors come forward with me, and put their shoulders to the wheel.

I repeat that with 500*l.* outlay, it is easy enough to make immediate profits by treating the lowest of the low-class ores kicking about upon the surface, and in the meantime let us rectify mining errors by putting up an engine at the Lower Holmush shaft. Why not? The property belongs to the creditors, and our representative ought to listen to reason. Without dipping further in the creditors' pockets, money can, no doubt, be secured upon mortgage, for the express purpose of working the mine, and when we get down where any quantity of mineral exists, yielding 1 per cent. to 3 per cent. of copper, and 4 ozs. to 8 ozs. silver per ton, the receiver can pay us our 20*l.* in 1*l.*, by instalments out of profits. Dr. Emmens will retain his valuable properties, win honour, wealth, and glory, and 250,000*l.* will be but a mere bagatelle; in fact, nothing but a "shode-stone" removed from the coffers of the Emmens United Mines, which are declared by one and all to contain almost unlimited quantities of low class arsenical, copper, and silver ores. *Ainsi soit il!*

Trafalgar House, Plymouth, Aug. 27.

T. J. BARNARD.

P.S.—Since writing the above I notice your able article in last week's Journal; allow me to point out one error. It is neither convincing nor conclusive that 2 per cent. copper ores pay so much better than 1 per cent.; in fact, 1 per cent. ores often contain as much, and sometimes more, silver than the 2 per cent. The main object is to successfully—that is, profitably—treat ores giving only 1 per cent. of copper and 4 ozs. of silver. Small profits but quick returns, on the gigantic principle, is mining's great desideratum. Now, for example, if 100 tons yield 1½ per cent. copper and 4 ozs. silver, another 100 tons only ½ per cent. copper and the same silver, it would be the wisest policy to mix the whole together and average all round 1 per cent. of copper and 4 ozs. silver, which represents a money value of at least 35*l.*; but, allow even 15 per cent. loss in the product not actually obtained, and 15 per cent. profit for smelters, equal in all to about 10*l.*, there is still 25*l.*, and the very richest tin mines in the world only average 2 per cent. tin, or 45 lbs., a commercial value (allowing very moderately for contingencies) of but 20*l.*. That the nascent copper process, with the new and only correct style of furnace, will effectually treat the poorest of poor copper ores, at one half the cost of the one hundred and one appliances necessary in tin dressing, I can positively prove, both by statements and facts.—Aug. 30.

T. J. B.

FLINTSHIRE LEAD DISTRICT.

Sir,—Before proceeding to give a short description and history of the several mines in detail which have signalled themselves in so marked a manner by their extraordinary productiveness in times past, I think it may be desirable to give a geological description of the Flintshire mining district.

This district may be described in general terms as a highly mineralised tract of country, extending in a north and south direction for about 30 miles, the stratification being contiguous to, and running parallel with, the coal measures, which border it on the eastward for the entire length. The most conducive rocks to the lead deposits are the carboniferous limestone (the fundamental stratum of this extensive range) and the chert (a silicious rock), which forms at intervals an immense "basin" lying upon the former, overlying the dark or black fossiliferous limestone, and in some instances giving place to the grit measures, also overlapped eastward against the coal measures by thick, dead, massive coverings of mountain shale, which bears but very slight traces of internal disruption, and into which the main veins very rarely, and but partially, penetrate. This shale-covering, however, forms a feature of much significance in the productiveness of the chert formation, as will be alluded to hereafter. The whole of these measures lie upon the first-named carboniferous limestone, first commencing in thin shallow coverings to the westward, taking their dip or strike eastward, and in that direction becoming thicker and deeper into gradually accumulating masses of strata of great magnitude, when the chert measures become, under certain conditions, receptacles of vast lead deposits; as also does the carboniferous limestone, sometimes in conjunction with, sometimes separate from, the former rock, and which limestone in its turn, forming an immense depth and thickness, hitherto practically unknown (but supposed to reach at least 1200 yards), stretches out westward, gradually decreasing in depth until it forms a thin cap or covering, overlapping the clay-slate formation, with portions of Old Red Sandstone lying between.

Having briefly described in general terms the chief strata of the district, and exposed in sectional detail the measures from east to west, which comprise those between the coal and clay-slate formations for from two to seven miles in extent, I think it expedient in the first instance to point out some of the peculiarities of the lead-bearing lodes of this district as compared with those of others, and then the conditions under which it is essential such lodes should be explored.

First, with regard to the character of the bearing veins. From a series of combined causes it has been found that the entire wealth of Flintshire as regards the lead ore deposits has been most unequally, but in some degree systematically, distributed throughout the lodes. Upwards of 50,000 tons of ore have been raised from one deposit in a chert vein, yielding as much, in the richest part, as 40 tons of ore to the fathom! These lodes at times, however, become impoverished from the slightest disorder; and, at the extremities of such bodies of ore, so irregular and insignificant that they have been known to be dormant for many years without being acknowledged even worthy of trial, after which they have again been discovered in all their original strength and productiveness. Again, at the separation of the two rich measures (the chert and limestone) a completely metamorphosed rock frequently intervenes (in cases where the veins are found to penetrate both measures) which baffles for a time all geological science or practical experience. The limestone is somewhat more regular, but still occasionally very much broken up and disordered where the black or dark limestone comes in conjunction with or intervenes between it and the chert. This irregularity, and the extraordinary rich deposits appertaining to this district, differ essentially from the clay-slate and other districts, where the lodes are worked in unbroken succession for upwards of a mile in length, but in which the ore is generally more scantily deposited throughout, though in nearly all cases more regularly distributed, and much more easily explored. Secondly, it thus becomes evident where such immense mineral deposits are met with, in an area so extensive and with such irregularities in their development, there must of necessity be some essential conditions necessary to confine operations strictly within a given scope, and this leads to a practical examination of the mines worked, and the results obtained. For this purpose, commencing at the Talargoch Mines at the northern extremity of the district, which have been worked profitably and uninterruptedly for upwards of four centuries, continually yielding large profits, we find these mines situate in the eastern extremity of the carboniferous limestone, adjoining the coal measures to the east, and so proceeding southward the Trelogan, Holway, Milwr, Halkyn, Maeslygan, Mold, Maesysafn, Westminster, and Minera to the extreme south, besides all the other great and celebrated intervening mines (too numerous to mention here), all under the same prominent condition "to the east, and in the vicinity of the coal formation," and it is a most remarkable fact that every main vein

so situated in the proper measures, and bearing the proper degree of direction, has without a single exception proved abundantly rich and productive, whilst explorations carried on in the centre portion of the district have generally proved signal failures, and those to the extreme west have done so in every instance. Having thus in practice found such to be the case, it may not be considered presumptuous to deduce a theory on which to found a basis for safe guidance in this matter. Seeing that all the great deposits are found with the deepest or thickest formations, and that they decline in proportion as they rise thinner westward, and almost wholly disappear where they form a thin cap or covering on the clay-slate, an enquiry naturally suggests itself as to the chief cause of these circumstances, and the line of delineation by which the true mineral belt of the district shall become known.

Nature has exemplified this in a very marked manner by the existence of large main capacious cross-courses running nearly north and south, or about 20° to the east of north, being evidently the channels through which the east and west veins have become charged with mineral, the deeper measures having naturally received the greater deposits of ore, whilst the western measures would be outside the pale of the influence as a conveyance for sublimation or otherwise into the veins, hence the limestone measures to the west of the great cross-courses would be impoverished, and speculation should be undertaken with great caution at the extremity of the western range. Having so far defined the true bearing district, within which compass investments carefully made and scientifically conducted may be considered legitimate and profitable undertakings, there are still wanting those guiding indications necessary to lead the practical miner to the hidden treasures therein contained; and seeing that the great riches are, so to speak, clustered together in limited spaces throughout the veins, even in the true bearing district, and that those veins contain a considerably greater portion of unproductive than productive ground, and that the veins themselves are in many instances indiscernible, it becomes most desirable to search and examine well and carefully every portion of the measures through which the veins have passed, and particularly those places which have been receptacles for such deposits, noting under what specific conditions they are presented before us. And, first, with regard to those in the carboniferous limestone rock, it would be erroneous to suppose that all veins in these rocks found in the true belt are rich, or even that all of them are worthy of trial, for in practice it has been determined that the best bearing lodes, termed "main lodes," run in a direction varying from east and west to north-west and south-east, and that the ore in them is chiefly discovered in rich "runs" dipping east with the measures, commencing at shallow depths westward, and increasing in extent, strength, and productiveness eastward and in depth, and that they are chiefly found where the cross-courses or cross-veins intersect, and form junctions with the main veins, or where a succession of "branch feeders" fall obliquely from the cross-courses into the main veins. And, lastly, with regard to the chert measures, proved so extremely rich, it has been found that in all instances the most important deposits have been contiguous to, and directly under, the mountain shale, which in every case covers these measures, and that the deposits have continually increased in bulk and value eastward and in depth under this formation, spreading out against it into huge bodies of solid galena, in some instances upwards of 10 ft. wide, and so pure as to require little or no dressing, being in some cases marketable as "Potter's ore" when brought to surface, and I may here remark the ores generally in Flintshire are readily dressed by the most simple process. A. W. THOMAS.

Coleman-street, London, Sept. 2.

THE HALKYN DRAINAGE SCHEME.

SIR,—In the *Mining Journal* of Aug. 21 I read an interesting and instructive letter by Mr. A. W. Thomas, of Coleman-street, under the above heading. The district through which the level he speaks of has to pass was some half-century since well known to all then connected with mining, but some 30 years ago, as those who were then connected with mining will probably remember, lead ore, which is now selling at 15s. per ton, had then fallen to about 8s. per ton, and although a great many of the large mines of the district were then making very considerable returns, the low and ruinous price of the produce would not compensate for the cost of engines and labour. In consequence of being indirectly connected with some of the mines that have lately been opened out—the chief amongst which I would name Prince Patrick, Saint Patrick, and South Prince Patrick—I have lately visited the district, where I spent some days, and walked over a greater part of the ground and mines named in Mr. Thomas's letter, and I was surprised upon hearing from authorities in the neighbourhood the immense quantities of ore returned, that so valuable a field for mining should have been allowed to remain so long almost untouched. Since the passing of this Drainage Bill by the House of Lords renewed vigour is decidedly apparent, and mining grants have been eagerly sought for.

Prince Patrick and South Prince Patrick are established successes, and paying very large dividends, at the present moment looking as rich as ever, more particularly the former, which is likely to pay shortly a dividend of 100 per cent. The next great success, in my opinion, will be the Saint Patrick, which is being prosecuted by a most energetic company. One thing particularly I noticed, and that is a splendid engine-shaft, which has recently been thoroughly timbered, cased, and divided, and this I am told at a cost of between 300l. and 400l. Cross-cuts are now being driven from two points in the shaft at different depths, and are well advanced towards the rich east and west lodes, which run from and through Prince Patrick and South Prince Patrick, both of which mines this sett joins. There are other mines in the neighbourhood well worthy of remark, but as Mr. Thomas in the latter part of his letter promises us further and full information upon this head, I shall not attempt to take from him a task he has so well commenced. J. S. HOUSTON.

Crosby Hall Chambers, London, Sept. 3.

AUDITING OF MINING COMPANIES' ACCOUNTS.

SIR,—I read with interest the very sensible letter of your correspondent, "An Accountant," in last week's *Mining Journal*, and I fully agree with what he says, as during the past 10 years I have had many opportunities of witnessing what the duties of company auditors really are, and how absurd it is to put amateurs to do the work. When I first addressed you on this subject I alluded to the GROGWINION LEAD MINE, which, although a generally well-managed concern, is not happy in its selection of auditors, notwithstanding that its outlay in that department is absurdly heavy. Fancy 50l. per annum for simply auditing a balance-sheet of a small mining company! In other lead mines, such as Van, Tankerville, Roman Gravel, &c., the auditors receive but a tithe of what ours do; yet I believe their accounts must be quite as intricate as those of Grogwinion, and require quite as much skill and care. These companies, moreover, have only one auditor; but, as all know, they get on very well, and, furthermore they do not find it necessary to publish "schedules."

I cannot understand what the honourable proprietor could have been thinking of who at the Grogwinion meeting proposed such a sum as 50l. for the auditors; but, being a West End man, he had, probably, no idea of what was to be done for the money. I can better understand the ideas of the other honourable proprietor who seconded the motion, as he happening to be a professional accountant no doubt felt it his duty to support his craft, even at the expense of his own pocket. With respect to the person called the "Shareholders' Auditor," I may safely say that he was never asked for by us proprietors, and I am sure his "red-tapism" is not at all wanted. I have heard that he was an intimate friend of a late director, and got himself elected to the post of "Shareholders' Auditor," not because another auditor was necessary, but because, lawyer-like, he wanted a job. I have no doubt also that he had hopes of ultimately becoming a director, but as our present board apparently manage affairs very well, I think they should not on any account be disturbed by having help thrust upon them, and certainly a London lawyer is not likely to be useful in managing a Welsh mine. The present number of directors (four) should be ample to carry on

successfully so small a company. I am sure the directors' fees are now heavy enough, but if the board is enlarged we shall, by-and-bye, be asked to increase them, and this we cannot at present afford. I hope, therefore, the shareholders will, one and all, consider these matters; for if we are not just to ourselves before being generous, it will be a long time ere our dividends assume anything like respectable proportions.

Our present payment of 50l. for auditors is much too heavy, and I have no doubt that a thoroughly qualified accountant could be found to do it for less than half the sum. Then, again, the amount charged for directors' fees is heavy, and I think our board ought to forego part of it until our dividends are increased, and then let their remuneration be raised *pro rata* to the profits of the undertaking. Such a plan would be fair to all, and might give the executive an incentive to work more profitably. I do not write this out of any disrespect to our chairman and directors, who I believe do their utmost for us; but still, as we are all shareholders alike, I take it that were such a course adopted it would be for our common good.

In conclusion, I hope the shareholders will not continue to allow money to be thrown away in useless auditors' fees, from which no good can result; but that some well-known professional accountant will be elected in place of the present auditors. I am sure the majority of shareholders desire that our time should not be wasted at future meetings, as it was last time, in listening to the unedifying discourse of would-be accountants respecting the proper form of balance-sheet, and explanations about "schedules," all of which, if desired, can be seen in the books of the company upon application at the office. I have myself been shown them by the secretary, who was most polite, and ready to supply the information I sought. Aug. 26. A CITY MAN.

MINING REPORTS AND ACCOUNTS.

SIR,—In view of the increased attention which investors will probably now devote to home enterprises, the present moment seems opportune for offering a few remarks upon the subject of mining reports and accounts, with the view of eliciting some consensus of opinion as to the best form for such reports and accounts to take.

Adverting, first, to the Reports usually appended to the prospectuses of new mining companies, I think most of your readers will agree with me in stating that too often the information given refers principally to the brilliant results attending the working of neighbouring mines rather than to the property actually reported on, and whatever mention is made of the latter frequently refers to practically unimportant details rather than to the true criteria of value. I do not mean to imply that this is designedly the case. On the contrary, I believe it mainly arises from a desire to adhere to a conventional style; but I do think reports should be so framed as to contain all the essential materials for forming an accurate opinion as to the value and prospects of the mine. Opinions may, of course, differ as to what are all the decisive features of any property, but I think my professional brethren will uphold me in pointing out the following heads of information as desirable in every case:—

- a.—The length of the sett on the run of each lode or mineralised cross-course.
- b.—The changes of bearing and respective ages of each lode and cross-course, and their variations of dip.
- c.—A description of the axis of elevation to which the veins belong, of the country rock and strata, and of the productive bearings and strata and nature of courses of ore as proved in neighbouring mines.
- d.—A description of the existing workings, and of the contents and appearance of the lode at each point where visible, and a statement of the total quantity of ore actually in sight.
- e.—The reasons for believing that the lode or lodes will prove productive on a sufficiently large scale, and a description of the steps recommended in order to test the mine before erecting a permanent establishment.
- f.—Working facilities, such as means of transport, supply of labour, fuel, and materials, opportunity of working by adits, existence of water-power, &c.

If the above details are furnished in every report I do not think many unsound speculations would pass muster, and although so many companies might not be brought out, yet a much larger proportion than at present would prove successful.

Coming now to the periodical reports made in respect of mines being worked, I would ask that they be rendered in a form better adapted to show the real position of the undertakings. As a rule they simply give an estimate of the value of the lode at each point, and a statement of the several bargains set to the men. In other words, expectations are reported instead of results. What I would suggest that these reports should give is as follows:—

- a.—A statement of the actual quantity and quality of ore sent to surface from each point, and the corresponding number of fathoms actually stoped or driven.
- b.—The size, bearing, dip, and character of the lode at each point.
- c.—The number of hands employed at surface and underground.
- d.—Any general information deserving of mention.

The effect of this would be that every shareholder could form a pretty correct judgment as to the value of his investment, and the probabilities of dividends or calls from time to time. The mystification which now enshrouds good and bad mines alike would disappear, and with it many a swallow-hole; while legitimate enterprises would stand better in the market, and *bona fide* investors would be less at the mercy of speculators.

As for Mining Accounts, they, indeed, show the broad financial results of each period, but they afford no means of ascertaining the causes of improvement or deterioration. Hence it is, as a rule, impossible for shareholders to know how still further to promote success, or how to apply a remedy in the event of misfortune. Now, mining resolves itself into a question of the cost of labour, fuel, and materials, compared with the net produce of the sales of ore. Hence every head of expenditure should be capable of being considered as a tonnage rate, and for this purpose mining accounts should give the following information:—

- a.—The number of tons of stuff of all kinds (ore, attle, &c.) raised to surface.
- b.—The number of tons and metallic contents of ore sent to the market.
- c.—The number of fathoms of ground stoped away.
- d.—The number of fathoms of new ground opened up—shafts, winzes, and levels.
- e.—The number and cost of hands employed, classified thus:—Superintendents; engineers and stokers; artificers; hands at surface engaged in preparing ore for market; hands at surface otherwise engaged; hands underground engaged in opening up new ground; hands underground otherwise engaged.
- f.—The amount of stores and materials purchased, classified thus:—Fuel, timber, building materials, plant and machinery, and sundries.
- g.—The amount of merchants' bills paid.
- h.—The number of strokes made, and the amount of fuel and oil consumed by each engine.

By means of accounts thus framed it would be possible to keep a periodical record of the following items:—

- 1.—The average yield of the lode.
- 2.—The exhaustion or increase of the reserves of ore.
- 3.—The cost on every ton of stuff raised to surface in respect of—superintendence, machinery, fuel, timber, sundry stores, stoping, development, dressing, and miscellaneous expenses.
- 4.—The duty of the engines.
- 5.—The net profit or loss on every ton of stuff; and a comparison of these averages from time to time could hardly fail to show precisely in what department an improvement or falling off had taken place. A publication of these results would, moreover, afford the means of accurately calculating the value of the shares of each mine.

As every one of your readers is deeply interested in this matter, I trust you will permit it to be discussed in your columns, for I feel sure the introduction of a better system of reports and accounts will do more to place mining on a sound basis, and attract public confidence in it as a steady and remunerative industry, than all the "hits" that have ever taken place. STEPHEN H. EMMENS.

8, Union-court, Old Broad-street, Sept. 2.

"A" AND "B."

SIR,—I write from no mere personal feeling or interest in either of these mines. I considered, as I still consider, that an amalgamation offered great and about equal advantages to both; but if I were to enter into all particulars and details, I should evoke angry and hostile criticism, and, perhaps, no little abuse, from interested partisans. I met with both some years ago when I went into Cornwall to investigate the dip of the South Condurrow lode, and published the result in my "Cornish Notes." The agents of South Condurrow pitched into me without stint, and denied that the lode would leave their sett at about the 90 fm. level. Now they openly acknowledge it. Again, in 1872, I publicly criticised the state of Grenville, then a dividend mine, and expecting to cut the South Condurrow lode, I showed that the dividends were most unwise, to say the least of it, because if the South Condurrow lode were cut into a new shaft would be a necessity, and another engine a possible contingency, for the further they got into the lode the more water they would have. This also was officially contradicted, and your correspondent proclaimed a "pestilent fellow" for daring to lift the veil that shrouded the works of Grenville. A reference, however, to that correspondence, published in the *Journal* three years ago, will show how correct I was in the prognostications that brought down upon me such a tirade of hostile criticism. In recommending an amalgamation of the two mines now, I prepared myself for the same sort of thing again from those having vested interests in things as they are, but it is for the shareholders themselves to go carefully and cautiously into the matter; and I venture to predict that three years hence those who now oppose will then, if they live, see the policy of my scheme.

Your correspondent, "A South Condurrow Shareholder," who writes in the *Journal* of the 21st, can know very little of mining matters if he really thinks that a lode which leaves a sett at about the 90 fm. level, and which to that depth has already been worked for nearly four years, can much longer yield a profit, or even pay the costs of an expensive mine. My proposition tended to insure the shareholders a continuation of ore ground and of profits. It is notorious that Grenville has the riches, and equally notorious that the shareholders seem to prefer pottering on at a monthly loss rather than lay out a few thousands in erecting machinery that would give them good profits. Amalgamation to them simply means giving up ore ground for machinery, instead of putting their hands in their pockets for a large sum of money to buy it. To South Condurrow, amalgamation means a longer and more prosperous career. To both, amalgamation means cheaper and more economical working; and this will be opposed by agents and merchants, and those whom they can influence. ARGUS.

ENGLISH MINE AGENTS—No. II.

SIR,—Why mine agents should be worse paid than other men holding a less responsible position I fail to see. Compare the salaries of quarry managers in North Wales (for having been several times through that Principality I happen to know what their salaries are) with the salaries of the mine managers, and you will find that the former will amount to more than double that of the latter. Whence cometh the difference? Are the quarry managers more intelligent, have they more work to do, or is their responsibility greater? Nothing of the sort. They have simply to let the bargains monthly, involving one hard day's work in the month, and see that the contracts are carried out by the under stewards. They have no correspondence, no book-keeping, indeed, nothing but look after the men; whilst a mine manager in the same district has not only to let bargains, &c., but he has to keep the books, keep up, sometimes, a wide correspondence, go underground every day, or every other day, not only to see that the men are doing their duty, but that they may watch the various changes which take place in the characteristics of the lodes or the surrounding formation; dial the mine, keep up the plans, &c., &c. How are we to account for the difference in those men's salaries? I must leave the question for someone else to give a positive answer. We all know that it is always the custom for the man who works the hardest to receive the least pay, but I do not think the mine agent is paid badly because he is worked the hardest. It may be, however, that there is more of sympathy and generosity in quarry proprietors than in mine adventurers. The keen Scotchman seems to know better than the sharp Londoner what will suit him best, and so he gives his agents a salary on which they can live.

English mine agents have about the same pay now that they had 30 or 40 years ago, whilst provisions are about 50 per cent. higher. In every other branch of industry wages have been raised in proportion to the value of provisions, but here they keep to the same level. What encouragement is there here for active intelligent young men to fit themselves for the occupation? I am afraid that on account of this so-called good policy our most promising young men will go into other branches of employment in which their talents will be better appreciated, and bring to them a better reward, and mining will have to suffer on account of it. I think I have said quite sufficient for the time on the question of wages. By your permission I will, in my next, speak of some other abuses which I think they have just reason to complain of.

MINING, AND MINE MANAGEMENT.

SIR,—I am happy to see that at last mining is once more on a prosperous tack, and I hope before long to see the standards still further advanced. Yet, what can it avail; the public must first have confidence in concerns, boards of management, &c., before they will invest their money, and I think this is as much a matter for attention on the parts of all concerned as any other detail in the management. So long as parties who are continually jobbing in the shares, and whose interests lie in the fluctuation of them, are the leading stars in the boards so long will confidence be more or less in abeyance.

Last week's *Journal* gives the case, in "A" and "B" Consols, of a shareholder refusing point blank to any amalgamation, when it must be evident that it would be advantageous, and which he now admits. Why this refusal? Because, no doubt, there would be one chance less of jobbing.

Why are reports not made regularly of certain mines which are being worked, or, at least, pretended to be, and the result of air compressors and machine borers, as well as the value of the mine, stated. I am sure the patient shareholders of (say) Wheal Agar (the boring machines in which we heard so much of at one time, connected with dinners, &c., no doubt at their expense) would fully endorse these views. N. O. R.

MINING—PRESENT AND FUTURE.

SIR,—With the above heading I wrote you a few lines on Jan. 11, 1874, and which you were kind enough to insert in the *Journal*. I then stated that I had good reasons for thinking that Mr. Barnard had succeeded in the profitable treatment of ores of a low percentage, and at the same time I threw out a hint to the shareholders in Wheal Crebor to be up and stirring, to be first in the field to take advantage of the process, as I know Wheal Crebor was one of the mines Mr. Barnard stated had thousands of tons of ore containing 6 ozs. of silver per ton, and which could be treated by his system, now known as the Nascent Copper Process. From the paragraph which appeared in last week's *Journal*, and also from Dr. Emmens' letters, I assume that all doubts as to the success of the process are at an end, and those who choose to take advantage of the process may look out for dividends instead of paying calls.

I am well aware that latterly the ores in Crebor have improved, and now average 5s. per ton, still I say let them at once take advantage of the system and get their poor ores treated, and turned into cash, and I again write "time is money." The reason so many people dislike entering into mining speculations is that there seems so much apathy, such a dislike to move out of the beaten track, that they evidently suspect mines are kept dragging along more for the sake

of merchants and others than for the benefit of shareholders. Again I say "time is money."—Sept. 1. A. S. Y.

IRON TAMPING BARS.

SIR.—In last week's Journal I was very sorry to see the serious accident at the Pedra-andrea Mines by the use of the iron tamping bar, and the remarks thereon showing that the men have to use what the agents provide for them. Now, in this mine the manager has provided wood rammers, which is quite sufficient for any rock they have in this or any other mine; but I must say the fault does not rest on the manager or the agents, but with the working miners, as many of them will not use these wood rammers, not only in this mine, but in many others that come under my notice. If the rock to be blasted is soft, then gunpowder, with sand packed in the hole on the powder, is quite sufficient with the wood rammer. If the rock is hard and tough, then use dynamite and sand, packed with a wood rammer would be equal to all requirements. If the hole should be wet, then place the dynamite in the hole, and the hole filled with water would answer the purpose; but while men are allowed to work with iron bars tipped with copper or not, so long shall we have these premature explosions and the fearful realities of tamping and picking or boring out mis-fired holes. I write this as a practical miner, and I am surprised to see in the present day such reluctance to give up the old custom of excessive tamping.

Cambridge, Sept. 1.

STEPHEN WILLIAMS.

MANX SILVER-LEAD MINERAL COMPANY.

SIR.—I have just seen in last week's Journal a report on the above mine, signed "J. Collins," in which he states that "it is on the same run as the principal lodes of Laxey and Foxdale." Mr. Collins should have known that it is not within four miles of the run of either Laxey or Foxdale lodes.

A MINE AGENT.

MARKE VALLEY.

SIR.—In reply to a "Country Shareholder" asking why I did not report on the eastern part of this mine, I must say it was because my attention was not directed particularly to that part of the mine, and I think the agent told me there was only one pair of men working in that direction. It also being my first visit to the mine, and believing I had quite enough to do in one day to see the various points in the western part is my sole excuse for not inspecting and reporting upon the eastern part. No doubt there are good points in the eastern part of the mine yet to be developed, which, as your correspondent observes, has turned out large quantities of copper of low quality, yet when we consider that every level in the western part—from the 80 up to the 10—are in productive ground of a most promising character, and that this in itself is equal to a new mine, I think your correspondent cannot fail to see that the agents are quite right in developing more particularly this fine portion of virgin ground with all the power at their command. As soon as the mine re-enters the Dividend List, which it is to be hoped it will do shortly, no doubt the agents will then turn their attention to the most prominent points in the eastern part of the mine, and develop them to the satisfaction both of your correspondent and all concerned.

A. T. JAMES.

WHEEL WREY, LUDCOTT, AND NORTH TRELAUNY.

SIR.—A great deal has been written of late, some in the *Mining Journal*, but more in the local newspapers, concerning these mines. The writers, however, appear to know but very little about the mines. I am in no way interested in their resuscitation, and am indifferent as to whether they are resuscitated or remain submerged, but I am not indifferent as to the truth respecting them. If they are worthless I have committed an error through ignorance, or a more grave and reprehensible affair designedly, as my published report differs in toto from the views and conclusions to which I refer and wish now to combat. I think it will not be denied that I ought to know the nature and condition of these mines as well as anyone. That conceded, it will only remain for me to affirm that my knowledge of the mines and their prospects has been fairly, fully, and truly expressed by me in my report. Concerning Wheel Wrey, the argument of one writer was that Capt. Peter Clymo had successfully worked it for some time, and then abandoned it from its having fallen off and failed to meet expenses, and that, therefore, the mine was worthless as a member of the present amalgamation. The other mines were pointed to in the same way, notwithstanding it was everywhere announced that not singly, but united, they were proposed to be worked, and expected thus to be worked successfully.

Nothing can be more unfair than to alter the conditions for the purpose of drawing adverse conclusions, and to set forth the deductions therefrom as a legitimate consequence. Capt. Clymo's abandonment of the mine was a prudent act, and creditable to his foresight and judgment. The paying section of ore ground in Wrey was in the south part, and dipping towards Ludcott, which of itself was insufficient to support Wrey as an independent concern. If the same or a similar section of ground had been on the north side of the shaft, and dipping longitudinally southwards, its future prospects, without any increase of intrinsic value of the lode, would have been much greater—sufficiently so to have incited a cautious man like Capt. Clymo to have continued the mine in working—but, as it was, the ore ground in Wrey had passed beyond their reach for profitable working, and became distinctively Ludcott's future prospect in depth, and therefore nothing remained for him to do, unless he was absolutely reckless of his own interests and the interests of the shareholders with which he was entrusted, but to discontinue the operations. But does that fact invalidate another fact assumed in favour of the amalgamated mines—that what would not support three separate establishments, each working to a disadvantage, would amply suffice to make one mine handsomely remunerative, especially when, as in the case before us, the objectionable features and defects of each can be so obviously and easily remedied.

The fault in Ludcott was not that the mine was poor, but that there was not enough of it to furnish supplies during an emergency, the lode in that part being only about 120 fms. in length, and consequently a hard channel of ground in the shaft aided by a large influx of water from North Trelawny incident to its stoppage brought about a crisis. Again, the ores raised in North Trelawny for years before it ceased working were found within 100 fms. of Ludcott shaft, and might easily and with considerable profit have been worked from the levels of that mine, and thus the thousands of pounds expended on the boundary shaft of North Trelawny, steam-engine, pitwork, cross-cuts, &c., would not have been required, whilst the current as well as the ultimate results of its working would have presented a different and more pleasing aspect.

The mines have been spoken of as old and deep, but they are neither the one nor the other. If they are old they are a standing rebuke to many a mine in Cornwall, as they were not known to exist for many years after I became a man and a mine agent. And as to their being deep, it is too late in the day to call mines deep at 106 fms. It only remains to work them vigorously and with care, after the manner indicated in my report, and the result I am morally sure will satisfy the expectations of its friends and supporters.

Llanvost Lead Mine, Aug. 31.

ROBERT KNAPP.

CORNISH MINING.

SIR.—There appears to be an idea prevalent now that the present depression has seen its lowest point, and that trade is recovering itself. Already copper has revived to a most extraordinary degree, and tin will doubtless follow suit, for a reaction in one department of the metal trade affects the whole. Arsenic has risen into a valuable commodity lately, and will, no doubt, help on several mines which before were feebly "tottering to their fall." We hear a good deal about "promising lodes for arsenic," and if these lodes contain arsenic pyrites (which they often do), then these mines are saved. There are mines which find the arsenic bill very convenient just now, although they are not dependent on it to keep their heads above the angry waves. One of our most promising mines is South Crofty. It is situated right in the heart of the mining district, having East Pool on the east, Old Pool on the north, Tinaroff on the south, and Cook's Kitchen and Dolcoath on the west. This mine would give confidence to investors. Shares which were 125s. each two years ago now fetch 18s., although the real value of the mine has increased very much. In looking at the last two reports, I find that the sales of ore this quarter amount to 6000, more than last quarter, and 12000, more than the quarter before—an enormous increase, amounting in the latter case to 50 per cent. in six months. In ad-

dition to this, a new lode has been discovered, which runs right through the sett, and the engine shaft (Beckford's) has improved in value from 30s. per fm. to a rise of 12s. in two months on a drop in tin; this shaft is being sunk with all speed possible to the junction of two lodes, when the agents expect a bunch of tin ground on the point of junction and below it. We think the agents should publish weekly reports in the *Mining Journal*, so that the outside shareholders may see the result of the junction, and know at once when the various points have come off. No one can doubt that in South Crofty there is a lasting and valuable property, and one that may yet vie with the famed tin mines of the county. The dressing department is also ably superintended, and every economy is exercised in each department, especially in the consumption of coals.

Sept. 2.

CORNUBIA.

LIMITED COMPANIES, AND LEGITIMATE MINING.

SIR.—Will you kindly allow me a small space in the Journal for a few remarks on this subject? It appears too frequently the custom, in this age of limited liability, for the promoters, where an undertaking becomes a success, to take to themselves the lion's share of the credit due to it, as well as the profits arising from it; and, in the event of failure, to attach the blame to the vendors and executive. I have been since Jan. 1, in the present year, engaged as manager of a mine in North Wales. The mine was purchased, and a limited company formed and registered, just twelve months since, in 30,000 shares, of a nominal value of 1s. each, or 30,000l. There were seven subscribers, and the amount subscribed, or to be subscribed, 25,000l., the balance of shares, representing 27,498l., being divided as fully paid shares among the subscribers and vendors. Out of the 25,000l. actual available capital the purchase-money had to be paid, which, together with the building of offices, stables, and other necessary work at that stage of the company's proceedings, absorbed about 4000l., leaving the handsome sum of about 21,000l. to work a mine representing 30,000l. capital. The consequence is, they have collapsed, and after spending the available 25,000l., and running up a debt of nearly 5000l. more, everything has been seized and sold by an execution from the County Court for a paltry sum of 800l., leaving unpaid claims to the amount of nearly 4000l., which, in my opinion, the holders of the 27,498 shares are liable for, but for the present the tradesmen, workpeople, and manager are victimized. The mine under local management, and with a local company, paid handsome profits for many years, and there is every probability of its doing so again with a very moderate outlay, as the mine is a mine of a lottery. At present, however, the reverse is the case, and not only the mine in question got into bad repute, but several families are suffering privations by the withholding of the people's hard-earned wages. Had the company honestly and fairly started the mine on its merits, openly stating the amount of actual subscribed capital, and its objects, it would have been a safe investment, and promoters and the public, with the tradesmen and employees, be each mutually satisfied.

Pen-y-pass, Llanberis, North Wales, Sept. 1.

CHAS. KNEEBONE.

LLANDILO SILVER-LEAD AND BLENDE MINE.

SIR.—In last week's Journal I noticed that an influential party is being formed for effectually developing the above-named property, and if it is carried out in its entirety, as proposed, cannot fail being eminently successful. I have been practically acquainted with this and the surrounding districts of Nant-y-Mwyn, Lisburne, and Cwmystwith for the past 15 years, and I know of no place in the South Wales district more worthy the immediate consideration of capitalists than the Llandilo, which with a moderate outlay and sound management will soon develop into a commercial success, for it scarcely comes under the category of a speculation. Its position for cheap and effective development cannot be surpassed, and the adit level being taken up in the goods yard of the railway station there will be no cost whatever for transit (frequently a heavy item in mines expenditure), as the smelters will buy the ores at the company's stores, and merchants will deliver their materials direct to the company's premises.

The geological features are identical with the great lead-producing district of Cardiganshire, the north, and having the limestone on the south, both rich in silver lead and blende ores. Several veins are supposed to traverse the property from east to west, but only one has to any extent been operated on, the bearing of which is from 12° to 15° north of east and south of west (which is the average bearing of most of the productive mines in Cardiganshire) size varying from 2 to 6 ft., and underlying about 2 ft. in a fathom northward. A level has been driven along its course 70 to 80 fathoms, and the Quarry shaft sunk on its course to the adit, and a winze to 10 fathoms below, in all of which the lode is productive for silver-lead and blende, worth in places 3 to 4 tons of the latter per fathom, which should fetch at the present price of spelter from 8l. 10s. to 7l. per ton, while the lead was steadily found to increase as depth was attained; and it is my candid opinion that if the Quarry shaft be sunk on the course of the lode another 20 fathoms a rich course of silver-lead will be met with, and the Llandilo become one of the leading mines of the South Wales district.

Pen-y-pass, Llanberis, North Wales, Sept. 1.

CHAS. KNEEBONE.

WEST GODOLPHIN MINE.

SIR.—While perusing your valuable Journal some few months since I observed some remarks made by a correspondent respecting the above-named mine, saying that it was a good speculation, that the returns would be increased and good profits realized. I was induced to buy a few shares, and I have great pleasure in stating that up to the present time I have no cause to regret buying, as (although tin was then from 80s. to 90s. per ton, which if it could be realised now would leave handsome profits) with the present low price a profit was made during the past three months, and future prospects very encouraging, not only in increasing the returns, but the manager hopes to lessen the costs now that the mine is put in trim, and increase the reserves. Seeing this, and with the hope of tin rising, if it is only 10s. per ton, 10 per cent. could be realised, even with the present rates. The shares can be bought at 25s., and if any reader of your valuable Journal happens to dispute the position of the mine, I think a few months hence will show that these remarks are not to deceive the public, but as a good guide for investment.

A SHAREHOLDER.

DRAKE WALLS MINE.

SIR.—Being fully assured that your valuable Journal is at all times open to an expression of the grievances of the mining public, and particularly in mines conducted without regular periodical publicity in your columns—as in the case of the above mine, which I regret to say seldom appears in public, or any information from any of the executives in charge of its financial position, I was at first start induced by the present manager and his colleagues to invest a certain amount of capital to the extent of 5s. per share, under the impression that the mine had been mismanaged—in fact, altogether mismanaged—by the former executive, and that under the superior management of Capt. Skeewis and Co. a good profit and interest for my money was inevitable, and without doubt. But to my great disappointment at the first general meeting for examining the accounts, and supplying Capt. Skeewis with 10,000l. to set things in order, a further sum of 6000l. was required (1s. per share), and up to this time no satisfactory information can be obtained from the officials in charge. Can any of your readers give me any information as to the direct prospects of the mine, and when the agents will set the mine in order to make the promised dividend?

A SHAREHOLDER.

[For remainder of Original Correspondence, see to-day's Journal.]

THE MINERAL RESOURCES OF THE SOUTH-WEST OF IRELAND—No. XX.

[FROM OUR SPECIAL CORRESPONDENT.]

BANTRY BAY DISTRICT.—A line drawn on a map from near the west end of Cape Clear north to Bantry Bay strikes through Coosheen Mine, the gap of Mount Gabriel, Dreenalmon Barytes Mine, and the gap of Rooska, into the cliffs on the south shore of Bantry Bay, near the Rooska and Keilovogue Lead Mines. This line shows the bearing or general direction of a great cross-course. I have examined it for the whole distance, some 25 miles. It must not be supposed, however, that this great cross-course runs in a straight line. In some places it is warped a considerable distance east or west of a north and south course, but it is found in the main line of bearing at the places indicated. At Cape Clear it cuts across the west end of the island, and forms the north and south harbours. In the eastern end of Coosheen Mine its presence is strikingly observable in the heaving of the lodes, altering the character of the rock, and forming no doubt great deposits of ore, as beyond the influence of the cross-course and slides the lodes are but slightly productive. The celebrated gap of Mount Gabriel is formed by this cross-course, which in its course appears to have attracted some of the mineral in Mount Gabriel, for near the gap considerable quantities of the green carbonate of copper, and also rich grey and purple copper ore, have been discovered in surface diggings; and as mentioned in a former paper, the agent of one of the most eminent mining firms in London sunk through a good lode of grey ore into blue slate-rock, and the lode having passed through the shaft is intact in whole ground to this day. At Dreenalmon Barytes Mine a great cross-course cuts across the western slope of Mount Corin; it keeps company for some distance with the great barytes lode, and forms a gap in this mountain, known in former times as the "Croppies Place." Dumanus Bay intervenes between Dreenalmon Barytes and Rooska; but in the line of the cross-course north of Durrus we find on the side of the hill approaching the gap of Rooska large boulders containing rich grey copper ore. There would, therefore, not only be a prospect but almost a certainty of finding rich copper and other mines by opening the numerous lodes near or in contact with the great cross-course. The mountain ridge of Rooska is rent asunder, and through the gap made by the cross-course we pass on to Rooska and Keilovogue Silver-Lead Mines. These mines from irregular surface diggings have produced considerable quantities of silver-lead ore, and near the surface large deposits of arsenical pyrites were found. In the winter months there would be sufficient water in Keilovogue to drive machinery for pumping, hauling, crushing, &c., but steam would be required during summer. An attempt was made to pump the water with a

horse-whim, worked by a crank, but all such appliances are sure where water is quick to end in disappointment and loss. To the east of Keilovogue, at Gurtyleona, a promising lead lode was opened some 4 fms. deep, and several tons of lead ore raised. Nothing, however, was done to prove the lode. In the Bantry district I have seen a silver ore lode (not silver-lead) opened, specimens from which not more than 6 feet under the surface produced from 100 ozs. to 300 ozs. of pure silver to the ton of ore. We may, therefore, find more profitable silver mines at home than in Nevada or elsewhere.

MINING IN THE SOUTH OF SPAIN—RIO TINTO COMPANY.

At Huelva I gave my attention to the works connected with the mining industry of the neighbourhood; the piers, the docks, and stations contrived for the exportation of its produce. The port of Huelva is formed by the estuary of the Rio Tinto, a river at the head of which the copper mines bearing the same name are situated. These mines, the largest in the district, and perhaps in the world, were well known to the Phoenician, Carthaginians, and Romans, who turned them to useful purposes; but became almost altogether unproductive in the hands of the Spanish Government, by whom, after being farmed out to a Swede named Wolters, in the last century, and to a Spaniard, the Marquis Remisa, at a later epoch, they were finally sold two years ago to an association of British and German capitalists, known as the "Rio Tinto Company." Two years ago the Rio Tinto Mines had no suitable outlet for their produce, but the company have since constructed a railway from the mines to Huelva, ending in a magnificent pier close to the city, in the most convenient part of the harbour, and almost facing the pier of the rival establishment of the Tharsis Mines. The railway from the Rio Tinto Mines to the pier is 87 kilometres in length; the pier is 1900 ft. long, 35 ft. above high-water mark, and 49 ft. above low-water mark. It has five lines of rails at different heights, and constructed to embark 1000 tons of material daily. The same pier will be equally available for the railway from Huelva to the mines, and also for the railway from Huelva to Seville, the two lines being, indeed, one and the same all the way to Niebla, somewhat less than half-way from Huelva to Seville.

Parallel to the Rio Tinto, and a few kilometres to the west of it, there flows another stream, the Odiel, near the sources of which are the Buitron Mines, further still to the west, on one of the tributaries of the Odiel, are the Tharsis Mines, a name once extending to the whole territory, and famous in ancient record. Both the Buitron and the Tharsis Mines have been for several years in the hands of foreign companies, and their produce is conveyed to the sea by private railway lines, terminating in convenient piers at or near Huelva, those of the Tharsis almost opposite to the city on the right bank of the estuary; those of Buitron at San Juan del Puerto, on the Rio Tinto, five or six miles above Huelva. Besides these rival establishments, there are many lesser mines—those of La Piedad, Lagunazza, Carpio, La Pila, &c., some of them still at work, but of which little more than the names need be mentioned. There is, moreover, across the broad stream of the Guadiana, which is here the frontier, in Portuguese ground, another great copper mine, that of Santo Domingo, exporting its produce at Pomaron, near Villa Real, for a long time under the management of Mr. Mason, who is known by the name of King of Santo Domingo, and upon whom King Luiz of Portugal has bestowed the title of Marquis of Pomaron. As the Rio Tinto Company has risen in opposition to the mines already at work in the same district, and in an enterprise of a more gigantic character than any of them, I deemed it desirable to pay my first visit to it. To travel from Huelva to Rio Tinto I had to retrace my steps to San Juan del Puerto, and hence by the trains of the private railway of the Buitron Mines to Valverde del Camino and Zalamea la Real—this latter the scene of Calderon's famous play *El Alcalde de Zalamea*. At Zalamea we took horses, and, after an hour's easy ride, came in sight of the Cerro Colorado, the central spot in the domains of the Rio Tinto Mines. The blushing tints of this copper-coloured mountain—all rugged and steep, crowned at the summit with masses of huge boulders piled up like the fallen stones of some gigantic Druidical temple, and flanked at the base by deep ash-coloured ravines, with here and there the gaps where the miners have cut into the heart of the mountain, make it conspicuous in all that cluster of dreary hills that compass it around, presenting a vast scene of desolation unmatched for savage grandeur and bleakness even in Spain. The mineral to which this place owes its value is a pyrites consisting chiefly of sulphur, iron, and copper, with a slight mixture of arsenic, silver, &c.—48 per cent. sulphur, 40 to 46 per cent. iron, and only 2½ to 3 per cent. copper. The silver is about 1 oz. to 1½ oz. per ton. To what purpose the Romans and other ancient nations dug the mines we know not with certainty, but in later times, and especially under the administration of the Spanish Government, little or no copper was extracted by a process of calcination and cementation; the iron and copper material being left to cumber the ground as refuse. The reason of this was that no material that was not of the highest and most immediate value was worth carrying on a mule's back through a region up to this day destitute of roads. When the Rio Tinto Company established itself here two years ago the very wheelbarrow was unknown, or at least unused; the work had to be done by men with hand baskets, and the mineral was laden on the backs of donkeys, the attempt to employ camels having turned out a disastrous failure. But the company, when it shall have provided the means of easy and rapid railway communication with the sea at Huelva, and thereby by its pier, a prompt mode of embarkation, will enable itself to ship off a thousand tons of material daily, or even, I am told, half-a-million of tons yearly. It will, therefore, have it in its power either to send abroad the mineral in the rough as it comes from the mine, or to decompose it, and export its various ingredients according as the raw material or its components command the best price in the world's markets. The construction of the railway and pier, by this time finished or very nearly so, must needs work a complete revolution in the economy of the Rio Tinto Mines; and although it may seem that the Huelva and Seville railway is less than the direct prospect of the company, it is clear that it will also benefit trade, by empowering the vessels which now come to take in their cargo of minerals at Huelva in ballast to bring hither goods from abroad, which may be landed at Huelva, and hence be conveyed by rail to Seville, Hu-lva becoming thus, as I have said, the port of Seville and of the vast provinces in the rear of that city.

The pyrites at the Rio Tinto Mines lies in three main lodes or veins to the north and south of the Cerro Colorado; it extends from north-east to south-west over a length of two kilometres, the southern lode, the best known, attaining at its greatest height 180 metres, and measuring 80 metres from the tunnel at the railway terminus to the summit of the mine. Altogether the company reckon that they have at their disposal 200,000,000 tons of their mineral, which, were even the exportation 500,000 tons yearly, would last them for 400 years.

Little as I consider myself competent to test the correctness of this estimate, I have no hesitation in declaring that the mass of mineral already open to view seems indeed immense, and I can equally bear witness to the alacrity and intelligence with which the works of excavation, as well as those of the railway and the tunnel, are carried on; whether we take into account the rapidity with which here the mineral, there the overburden, are moved along in four lines of railway, or the direct tramways, by wagon trains drawn by mule or steam engines, the speed with which the gang of labourers, perched on the brow of the ravines, ply the pickaxe and spade, digging deeper and deeper into the mass, which seems to grow before them as they advance. In the mines, on the tramways, in every department of the tidy workshops the influence of the leading man is apparent—that of the chief engineer, Mr. Blum, or, as they call him there, "Don Teodoro," a man of rare energy, with a good hard German face, and a high forehead, "harboured," as one might say, "two brains one atop of the other," a man out and about, and somewhat hard and Bismarckian in his dealings with the men, but who, as he has lived 16 years in Spain, ought best to know the implements he has to work with, and deems, probably with good reason, a policy grounded on fear safer than a rule upheld by love. He employs about 1700 men in the mines, he tells me, and is never at a loss for "hands," though he has to keep the workmen well under his thumb, as they are apt to break or wriggle out of their contract, deserting their post, especially at harvest season, as do the negroes in the West Indies, when the ripe crop of coconuts beckons them to their squatter's lots. Besides the workers at the mines, those on the railway and the pier constitute a mass of upwards of 5000 labourers dependent on the company for subsistence. Such a Providence would foreign capital be for Spain, were the discords and revolutions of the country and the jealousy of its people not to stand in the way of its well-being! The price of labour, I am told, has not been affected by the civil war, though it has experienced a slight rise in consequence of the demand growing with the extension of mining enterprise. Mr. Blum told me the two great enemies he has to contend with are "the priests and the bulls," the religious festivities and the popular games connected with them, from which he too frequently vainly strives to wean his best "hands."

Three days at the mines, and had leisure to make the ascent of the Cerro Colorado, and to go over the extensive tracks of the old mining works of the Romans. The whole hill at the top, and more especially on its northern slope, where it covers the middle and northern lode, is honeycombed with their shafts, some of them still open, most of them obstructed by the alluvial soil flowing into them for centuries. These shafts are by thousands, at little distance from one another, and apparently all vertical. It seems that the Romans told off their gangs of labourers, probably slaves, in little bands, bidding them test the ground at different localities, and carrying on their excavations so far as their toll was rewarded by imminent success, and abandoning the spots where the more sustained exertion was called for. Even in this desultory tentative manner the amount of labour of which the traces are before us is truly astonishing. For miles and miles round the hill the scorie or slag of the metal, which they carefully smelted, cumber the ground, oak and cork forests struggling hard, yet vainly, to obliterate the vestiges of man's handiwork by throwing upon it for centuries the pall of their decaying foliage. Thanks to the strictness with which the forest laws are enforced by the company's agent within their domains, the landscape in the rear of the Red Hill is fresh and verdant and park-like. High on the top the rock is studded with iridescent limestones, a variety of gem-like stones of surpassing beauty, treasures in the eyes of a mineralogist. Down in the valley are scattered masses of hewn stones, shafts of broken columns, and open graves, clear indications of a temple, a burial ground, and extensive habitations in old Christian-Roman times, the remnants spreading over the thickly-wooded ground for many a rood, to become hereafter the field for the study and, perhaps, edifying discoveries of the antiquary.

No less interesting was the exploration of the underground recesses of the mine, which we accomplished by going in at a narrow low gallery, 800 metres in length, cut into the slate rock, probably an old Roman work, and placed a few metres above the tunnel, which is to terminate the railway, and constitute the main inlet and outlet of the mine. We entered, three of us, the chief engineer taking the lead, all clad in miners' jackets and wearing miners' hats, bearing each man a lantern, picking our way carefully on the tramway, stepping aside and making ourselves small when a mule drawing trucks laden with ore had to pass. At the end of the corridor the grand hall of the mine opened before us, a vast lofty apartment, grim and dark as Pluto's throne-room, with yawning galleries opening on all sides and in every direction, a busy scene swarming with men, all moving about the dim, dimly lighted space, with lights apparently stung to fire flies, their long shadows flitting before them, and acquiring weird gigantic shapes as they rested on the projections of the rough hewn rock of the vaults, or were lost in the depth of the taper caverns. We soon became accustomed to the still, sulphurous

atmosphere, and experienced but little of the inconvenience said to arise from "the close and poisonous air," nor were we painfully affected by "the sound of the pick of the solitary workmen hammering away alone in his stone niche, like some confined demon endeavouring to force his way to light and liberty." Life in that subterranean world did not seem unendurable, the human beings with whom we came in contact, though grave and solemn, by no means downcast, but conversing in subdued tones, earnestly intent on their pursuits, the only striking sound being the occasional muffled boom of the miner's blast overhead. We were on the ground floor of the mine; above us were eight other stories, the workmen on each of them a long range of galleries and spacious chambers like those where we stood, all of them accessible by ladders, and ending at the open mine, 88 metres above our heads. Beneath our feet were unexplored depths, supposed to go down towards the earth's centre, all valuable mineral to the lowest bottom, the distance from it being as great as was the height of the superincumbent strata. The mass above and below us is the "lenticular lode," the centre of the southern vein, where the work has hitherto been carried on to the greatest length and with the most satisfactory results. We were placed in the centre of the main hall, and men were sent with lights along the corridors to the right and left to give us a practical idea of the width of the lode, extending, as I said, to nearly 150 metres. We proceeded to other galleries and chambers decorated at the vaults with rich stalactites, assuming in that dingy air the most beautiful greenish hues of emerald or malachite, here clinging to the rock-like lozels and long keen sword blades, there coming down to the floor in heavy pillars festooned by quaint ornaments like the capitals and bases of columns of some strange fantastic order. We were told that in some of the upper stories the stalactites drop down in such huge sizes and quantities as to entirely obstruct, fill up, and obliterate the excavations through which the open air, changing into dull dusky brown as soon as they are exposed to daylight. We were also shown the way to the lower parts of the valley, where the process of calcining and cementing the ore is carried on. So imperfect and clumsy was the way in which men employed by the Spanish Government went to work the last day that, as appears from their books, in a whole year, 1873, they only extracted 53 tons of copper from the mine water, while the company obtained from the same source 173 tons in 1874; and the same proportions are observable in the results of all other mining operations, the labour of the company yielding a produce four times as large as the workmen of the Government were ever able to make. The engineer thinks he can get 1,000,000 worth of good metal out of a mass of half-burnt material which the Government agents have left to cumber the ground as unprofitable refuse.

From all the foregoing it will appear sufficiently evident that a boundless source of wealth exists in the Rio Tinto Mines. The fear is lest these sources may prove to be over-productive, for the Rio Tinto Company have to contend with the rivalry of other copper mines in their immediate neighbourhood, to say nothing of many others in other parts of Spain and the rest of the world, especially in Chili. The Tharsis Mines, which were taken in hand by a French company in 1855, superseded by an English company 11 years later, yield 480,000 tons of pyrites annually, shipping off 250 tons, and cementing the remainder. The annual produce of Buiton, at work since 1850, is said not to exceed 70,000 tons; but that of Santo Domingo amounts at least to 200,000 tons. Mr. Mason, for these last 20 years the owner of this last-named establishment, is commonly said to derive a yearly income of 50,000, from his mine. "About 600 British steamers and sailing ships," says Mr. Latouche, in his "Travels in Portugal," "annually enter and leave the port of Villa Real, where formerly a dozen coasting vessels sufficed for the whole trade in honey, sardines, and dried figs." So much can English enterprise achieve for the benefit of these Iberian regions! The establishments of Tharsis, Buiton, and Santo Domingo have the start of the Rio Tinto Company, to say nothing of their mines being considerably nearer to their respective places of embarkation, the length of the railway of Rio Tinto being 84 miles, while that of Tharsis is only 48, that of Buiton 56, and that of Santo Domingo only 11 miles English. By way of compensation, we are told that the mineral at Rio Tinto is in every respect superior in quality to that of the other mines, the proportion of copper being 2½ to 3 percent, while it is only 2 percent at Tharsis and Buiton. The tug of war between these rival neighbours will be sharp, even if Rio Tinto succeeds, as it flatters itself, in ousting Chili from the European markets. The important point would be to ascertain how many tons of pyrites can find purchasers, and to what extent one may hope to increase the demand for it. The importation of this material into Great Britain was, in 1874, 500,131 tons, being a decrease of 20,000 tons from the importation of 1873, but an immense increase on former years, as, for instance, upon 1866, when it was only 180,000 tons. The total annual consumption of pyrites in this country is reckoned at 700,000 tons; but a considerable quantity is obtained from Ireland, I believe from the Wicklow Mountains. But even admitting that 1,000,000 tons or a larger quantity may be required by Great Britain and by other countries, it may be doubted whether the market will admit of so large an additional supply as the Rio Tinto must, if it is to pay its way, bring into it. The company trust that if the demand for pyrites should fall off they might still go to work converting their mineral into copper, no glut of this metal and no abatement in its price being apprehended, but I do not know how far Rio Tinto may hope to produce better or cheaper copper than its competitors; and, to begin with, water is necessary for the work of cementation, and water this year, owing, perhaps, to unusual drought, has been for several months so scarce that the engineers are planning a large reservoir to insure a constant supply, a scheme not quite certain of success, and, at all events adding to the expenditure of time and money already caused by the purchase of the mines, and the work of the railway, pier, and other appurtenances of an establishment on so large a scale. There will be, no doubt, for a few years, a neck and neck race between these rival mines, and the one which emerges as the winner will be to bring things to their proper level, giving the mining enterprise in the South of Spain a healthy stimulus and development, equally beneficial to that country and to the rest of the world.—Special Correspondent of the Times.

Meetings of Public Companies.

OREGON HYDRAULIC GOLD MINING COMPANY.

The statutory meeting of shareholders was held at the offices, Austinfriars, on Tuesday.—Mr. J. IRVING-COURTENAY in the chair.

Mr. W. J. LIVINGSTON (the secretary) read the notice convening the meeting.

The CHAIRMAN said: Gentlemen, I do not intend to detain you long to-day, for the company being less than four months old, and the reports of Mr. Bowe and Mr. G. S. Powers on the property being so thorough and exhaustive, there is little new left for me to tell you. I will give the substance of these reports, with such later information as I possess. The area of the property is 588 acres, and these are divided into five sections, or claims, and will be known in future as the Reed, Effinger, Thoss, Steel, and Mines claims. The gravel throughout the entire mass will average 100 ft. in thickness, but in many places it is over 200 ft. in depth. It has been well tested by the washings of Messrs. Reed and Thoss, and both Mr. Bowe and Mr. Powers prospected it thoroughly by the well-known California method of washing with a pan. Mr. Bowe considers the gravel (judging from his own tests) as "much richer than average hydraulic ground in California," while Mr. Powers says it possesses this advantage—that while similar in appearance to the great Blue Lead of California it is not cemented hard, as that is, and will not, therefore, require to be blasted with powder, thus a very material item of expense will be saved. Another very important element is the absence of pipe-clay and boulders. To those accustomed to gravel washing, and who, therefore, know how costly the presence of these is to the hydraulic miner, this fact adds greatly to the value of the gravel. We propose working in the first instance sections Nos. 1 and 3; there are 30 acres in No. 1, and 160 in No. 3. The main ditch will bring water to No. 1 claim, and is now being constructed of a capacity of 2500 in., and will be four miles long, and its estimated cost is 35000. Two miles of ditch have been contracted for at about 12000 cost, as I learn from a telegram, the written advice not having had time to reach this country. We think we shall not have quite 2000 in. this season, but there are other sources available for the supply of the main ditch which we shall tap in the spring. Section No. 3, or the Thoss claim, we also intend fitting up for washing this season. We shall have to build a ditch on this section also—a very short one, only one mile long. With repairs to existing reservoirs and other improvements the water supply will be raised to 500 in. for six months for this portion of the property. The gravel here is reported to look even better than on claim No. 1, so that this section ought to give a good account of itself next season. There are excellent outlets to the property provided by several gulches which intersect it; they are precipitous, and give a fall of 600 ft. to Galice Creek, thus providing abundant space for dumps, or places for tailings. We intend constructing a short bed-rock tunnel; it has been contracted for, and will cost about 3000.

Mr. Foor called attention to the change of mode of working; it was now proposed to work Nos. 1 and 3, but Mr. Powers recommended that Nos. 1 and 2 should be worked. He wished to know the reasons for the change.

The CHAIRMAN said: No reasons had as yet been assigned by Mr. Bowe. He assumed, however, that the Thoss claim was found to be more easily fitted up than was at first thought for, and that, therefore, it was deemed advisable to begin on it without delay. Regarding working capital, he might say they did not intend to issue more than another 20000, or 30000, of preference shares, as they considered from the estimates and contracts made that that amount would suffice, in addition to what was already subscribed. In that event there would be about 90000, of preference share capital, which would be the whole amount upon which dividends would have at first to be paid. There was a sum of 52000, to be paid out of profits to some of the vendors, which would be paid to them *pari passu* with the preference shareholders, that is for every 1000, of profits earned one-half would go to the preferred shareholders, and the other half to

the vendors till they had been paid the above sum, and after the preference shareholders had been paid back in full then their preference shares would cease to be entitled to any preferential dividends, but would rank as ordinary shares. If the property was only half as good as Mr. Powers thought it was, for his report stated that with 2000 in. of water on Nos. 1 and 2 sections a monthly dividend of \$25,000 would be realised—i.e., during the wet months of the year—it would not take very long to pay these amounts of profits. He had met Mr. Powers last year, and had visited him at You Bet, and he knew what a high opinion that gentleman entertained of the property. He (the Chairman) had much confidence in Mr. Powers' skill and knowledge as an hydraulic miner, and relied on his judgment.

The CHAIRMAN, in reply to questions, stated if the property only turned out one-half as good as Mr. Powers believed it to be, every shareholder would be more than satisfied with the result. It should not be forgotten that the capital of the company was divided into preference and ordinary shares—the preference shares were only 3000 in number of 40 each, and entitled to be paid back in full out of the profits before the ordinary shares ranked for dividends. Looking at the estimates given them, and the contracts already made, the board did not anticipate it would be desirable or necessary to issue more than 20000, or 30000, of the preference shares—in other words, they thought an issue of 90000, of preference shares would be sufficient to fit up the two properties for washing. Mr. Powers' estimate was that the cost would not exceed 70000, and the directors saw no reason to doubt but that the estimate would come out tolerably correct.

A SHAREHOLDER asked if the board had any information as to the reason Mr. Bowe had recommended the fitting up of No. 1 and No. 3 claims, instead of Nos. 1 and 2, as advised by Mr. Powers?

The CHAIRMAN said that Mr. Powers first visited the property on behalf of himself and those with whom he was associated, and the very strong opinion expressed by Mr. Powers had induced them to take the trouble they had done in the matter. Perhaps some clue to the deviation from the original plan was to be found in the fact that it was subsequently found the water-right at the Thoss Claim was much more important than they had been led to believe. Upon this point Mr. Bowe wrote—"The Thoss Claim and water-rights I consider of much more importance than we have been led to think. With a little improvement put upon the old reservoir, and the construction of another small one, for distributing purposes, coupled with the enlargement of the old ditches, and the construction of a comparatively short and inexpensive new one, for the purpose of conducting the water on a higher level to the new reservoir, 80 ft. more pressure can be obtained, and a much larger supply of water utilised." With these improvements Mr. Bowe thinks the Thoss water rights would be swelled to 600 in-fms for three months, 300 to 400 inches for two months (24 hours' water), and 200 inches from two to three months longer (10 hours' water); this would make an average supply of about 500 inches for five to six months. If this supply can be obtained—and Mr. Bowe thinks it can—he says the Thoss Claim will make a very satisfactory showing, if the half Mr. Bowe has been assured of as to its former yield be true. When this property has been fitted up as contemplated they will certainly be able to wash off as much in two months, with one monitor running 500 inches of water, as has been done in several seasons in a rude way. Referring to the Oregon property as a whole, Mr. Bowe says it has the great merit of not having been "worked out before purchase, or even partially worked out. It can only be said to have been thoroughly prospected, nothing more." Whatever gold there is in the deposit, this company had only to take it out, and with the facilities at hand Mr. Bowe considers that this can be none other, and with good profit on the outlay for depreciation, so as to cover any loss on account.

After some further discussion of an unimportant character, the proceedings closed with a vote of thanks to the Chairman and directors.

BAGWORTH COLLIERY COMPANY.

The fourth general meeting of shareholders was held at the London Tavern, on Wednesday.—Mr. JAMES WRIGHT in the chair.

The notice convening the meeting was read.

The report of the directors stated that during the past year the coal trade, owing to various causes, has been much depressed, and prices have been very low; nevertheless, by a careful and prudent policy, your board has every reason under the exceptional circumstances to feel satisfied with the results. After allowing for the interim dividend paid on Jan. 20 there remained a balance of 37200, 11s. 10d. in hand. There has been set aside a sum of 10000, so as to cover any loss on this account. The buildings, fixed and working plant, have also been enlarged and improved, thus adding to the value of the colliery, and your directors are satisfied that the company's property and works are in a most efficient state, and the colliery is in the best working order. Out of the balance of 37200, 11s. 10d., the directors recommend a further dividend of 7 per cent. for the six months be declared; this, with the previous paid interim dividend of 5 per cent. for six months, will be equivalent to a dividend of 6 per cent. for the whole year.

The CHAIRMAN said the report was short simply because the directors had not a great deal to say, and probably the least said is the soonest mended. They had conducted their business throughout the year with satisfaction, and with results that enabled them to declare the dividend proposed. The coal trade throughout the past 12 months had no doubt passed through a serious crisis, but they, as far as this company was concerned, had fortunately avoided strikes. Their sales had been up to nearly the usual standard, but the price had been necessarily low. The balance-sheet was much better than he had anticipated, for although for several months back the sales had been kept up the ratio of profits had not been maintained. The total valuation of the plant had not increased nor diminished, the absolute additions made, irrespective of the improvements which were gradually being effected in the method of working the colliery, had cost 9000, the whole of which might be fairly considered an additional asset. Mr. Gleadow, their superintendent, was present, and would be glad to afford any information desired in respect to the underground workings, which he would tell them were now in a much more effective condition than at any previous period. Although they had not attached any money value to it, undoubtedly the colliery was in a much better condition than it had ever been before. They had set aside a certain amount on account of depreciation, and out of the residue of the profits it was proposed to pay a dividend of 7 per cent., which would leave a considerable amount in hand, but not more than the board considered necessary for the proper working of the colliery. He then moved that the report and accounts be received and adopted.—Lord WILLIAM PHIPPS seconded the proposition.

Mr. PAGAN had visited the colliery since the last meeting, and had come to the conclusion they had paid too much for their whistle, but he was not so great a fool that because they had paid too dearly they should not try to make it as profitable as possible. He then drew attention to several items in the balance sheet, and referring to the dividend said he could not understand what method had been adopted in dividing the profits. They were told the profit had been 37200, out of which it was proposed to declare a dividend of 7 per cent., whereas it was sufficient to pay 15 per cent., and carry over 5000; either that amount should be paid in the shape of dividend or carried forward to a reserve fund for equalising future dividends.

Mr. COOPER reviewed the statements in the prospectus, and expressed dissatisfaction at the result of the year's operations. They had been promised 25 per cent. with coals at their present price, and it did seem to him there was much work going on. What he most complained of was the enormous amount of expenditure: the salaries at Bagworth amounted to 13400, per annum.

Mr. WILSON said it did seem the expenses had been much too large considering the work done: before declaring the proposed dividend there should be written off something for depreciation of the lease of the property, which had only 18 years to run.

Mr. JAY, as the largest shareholder who had purchased shares, when a vacancy had occurred on the board by the resignation of the Chairman, wrote to the directors announcing his intention to offer himself as a candidate for the vacant seat. Without meaning anything offensive to the directors, the present board did not represent the shareholders but the vendors, and he thought it was time the shareholders moved in their own interest to alter the present state of things.

The CHAIRMAN said there were three shareholders who had equally expressed a wish to be elected directors, and the board would not take upon themselves the responsibility of the nomination. Mr. Armstrong had probably retired because he had been unfortunate; the secretary had resigned because he had since become a member of the Stock Exchange, and the auditor had got into difficulties. The directors had had in view the filling up the vacancy caused by the resignation of the late Chairman, and that he is in communication with the largest shareholder, Mr. Coates. In reply to further questions he (the Chairman) said that the additions made to plant consisted of building two cottages for the underwriters; adding boilers, rolling stock, and wagons. As to the railway charges, those of course varied according to quantity, and did not affect the question of price in any way whatever. As to the proposed dividend, he believed 7 per cent. would absorb about 18000, leaving 25000, which was absolutely required for working capital. If they called up the whole of the capital they would diminish their credit. The salaries at Bagworth amounted to 13400, per annum, and the directors were quite willing for any shareholder to go to the works and investigate every item. It did not appear to be generally known that at the end of the lease all the improvements would be valued as a going concern. The cost of getting coal he calculated was something like 9s. per ton, and the selling price about 10s. or 10s. 6d., but it was now a difficult matter to make any positive statement upon the subject, as they did not know the amount of cost from day to day.

The CHAIRMAN said the board had the most unbounded confidence in Mr. Gleadow, and the only reason that statements in the prospectus had not been borne out by facts was the extreme fall in the price of coal and the extraordinary diminution in profits.

After some further discussion, it was unanimously agreed to receive and adopt the balance-sheet, and to declare a dividend of 7 per cent.

A committee of conference was appointed (consisting of Messrs. Buckingham, Pagan, and Jay) to report to the shareholders at an early date.

A vote of thanks to the Chairman and directors concluded the proceedings.

THE SILKSTONE FALL COLLIERY COMPANY.

A meeting of shareholders was held at Barnsley, on Monday. The meeting, which was called by circular, was "an extraordinary special meeting for the purpose of taking into consideration the present position of the company, and to pass a resolution, if necessary, for winding it up and appointing a liquidator." Mr. W. BAKER, of Saddleworth, the chairman of the company, presided. It may be stated that the company was floated with a nominal capital of 50,000, and amongst the first dividends paid was one of 25 per cent., which it was stated was paid out of the capital of the company. The whole of the first directors were removed from office, and a new board appointed. At a meeting held on March 1, the Chairman proposed that the capital should be reduced from 50,000, to 10,000. This was worked to a profit. This was done, and the directors have until a recent period been working the Thorncliffe seam, and utilising a bed of fire-clay for making bricks.—The Chairman stated that this had also been abandoned, as the clay was worthless. The directors also found that the company had leased from the Yorkshire Wagon Company and the Sheffield Wagon Company about 250 wagons, the leases for which would not expire for some time. Seeing the position in which they were placed, he communicated with the two companies. The secretary of the Yorkshire Wagon Company met him, and agreed to take the wagons off the company's hands from July 1, but the Sheffield Company would have nothing but the full rate. Under the circumstances the directors saw there was nothing left but to wind up the concern. At that time they were indebted to the bank to the amount of between 30000, and 40000, which money had been guaranteed by himself and his brother director. They had a sale in June, and, considering they had pledged themselves with the bank, they paid the bank off. Many of the directors had been great sufferers, and after all he had done he believed he should lose fully 10000.

The Chairman proceeded to explain at great length the proceedings which followed, at the instance of the Sheffield Wagon Company, who issued a writ and caused him to appear twice in London, and ultimately he advanced nearly 10000, out of his own pocket to settle the matter. He also referred to a letter which he had received from Mr. Warwick, of Bucklesbury, London, who said he acted for himself and a number of shareholders, asking if something could not be done with regard to winding up the company. Seeing that was his wish, he moved that a committee of inspection be appointed to make a searching investigation into the past and present state of the company, as he was not afraid of any person investigating what he had done. After a lengthy discussion, it was agreed that the committee of investigation should be dispensed with; and Mr. Kimber (London) moved, "That, as it had been proved to the satisfaction of the shareholders that the company could not be by reason of its liabilities carry on its business, it be voluntarily wound-up." Mr. Culpin seconded the resolution, which was carried unanimously. Mr. Crabtree (Halifax) then moved, and Mr. Chambers seconded, "That Mr. Baker, the Chairman, should be the liquidator." Mr. Warwick (London) moved, as a proxy for Mr. J. Dawson, of Exeter, and seconded on his own behalf, "That Mr. John Vein Young, of Bucklesbury, in the City of London, public accountant, be and is hereby appointed liquidator of the company." On the motion and amendment being put, 15 hands were held up for the motion, and the Chairman produced 33 proxies. Mr. Warwick voted for himself and 57 shareholders. The Chairman said only 38 of the 57 shareholders were available, the others not being witnessed. Mr. Warwick demanded a poll, which the Chairman said he would fix by circular.

DOLCOATH MINING COMPANY.

A three-monthly meeting of adventurers was held, on Monday, at the mine, Sir F. M. WILLIAMS, Bart., M.P., presiding. There was a large attendance of shareholders. The accounts showed that the labour costs for the four weeks ending June 12 amounted to 20080, 17s. 7d.; for the month ending July 10, 19080, 6s. 9d.; and for the following month, 19230, 8s. 1d.; the tribute cost was 21300, 0s. 7d.; the merchants' bills, 39600, 1s.; poor and way rates, 500; and Stannaries assessment, 17, 17s. 7d.; total, 12,070, 11s. 7d. The receipts for 299 tons of tin ore, after deducting 7450, 11s. 8d. for dues, amounted to 14,176, 15s. 9d., leaving a profit on three months' working of 21060, 4s. 2d. The agents' report said:—

Since the last account we have holed the winze from the 314 to the 326, and set the ground to stone. We have also begun to sink the engine-shaft, which is now 6 ft. below the 326, where the lode is worth 12 ft. long 120 per fathom. The 326, east of engine-shaft, is worth 1000 per fathom. The 326, west of engine-shaft, is worth 400 per fathom. The winze under the 314, west of engine-shaft, is sunk 5 fms., and is worth for 9 ft. long 500 per fathom. The 314, east of engine-shaft, is worth 300 per fathom. The 314, west of engine-shaft, is worth 350 per fathom. We have commenced to sink old sump-shaft under the 302, where the lode produces a little tin, but is not of much value. The 302, east of new east, is worth 120 per fathom. The 302, west of old sump, is worth 600 per fathom. The winze under the 290, just over this end, is sunk 7 fms., and worth for 9 ft. long 900 per fathom. The 290, east of new east, is worth 100 per fathom. The 290, west of old sump, is worth 100 per fathom. The 278, west of old sump, is worth 120 per fathom. The 268, west of old sump, is unproductive. Harriet's shaft is sunk to the 264, and we have commenced to drive south at that level to intersect the lode. The 264 south, west of old sump, has nearly reached the south lode. We shall shortly effect a communication between this end and the 248, east of Harriet's shaft. The 248, west of Harriet's, is worth 120 per fathom. The 236, west of Harriet's, is unproductive. At the 236, east of Stray Park, we are raising above the level towards the winze under the 215, which is sunk about 20 fms., and which, when holed, will lay open some tin ground of moderate value. The above valuations are made at the present price of tin, which is about 500 per ton.

The report and accounts were passed, and a dividend of 10s. per share declared, a balance of 1630, 4s. 5d. being carried forward to the credit of next account.

The CHAIRMAN then alluded to the coming departure of Mr. G. K. Cartwright from the county, and said they all regretted very much that they were about to lose the services of that gentleman. Mr. Cartwright had at all times most ably represented Mr. Basset at the meetings of the mine, and for himself personally, as well as for the committee, he could say that they had met with nothing but universal courtesy and kindness at his hands. He was quite sure also that this had been the experience of all who had been brought into business contact with the gentleman, and the feeling of regret in the county at his departure was both general and sincere.

On the motion of Mr. HOLMAN, seconded by Mr. WHEAR, a cordial vote of thanks was given to Mr. Cartwright for his services in the interests of the adventurers during the eight years that he has been on the Dolcoath committee, and it was further resolved that Mr. J. Leonard Boulton, who succeeds Mr. Cartwright in the stewardship of the Teldy estates, should be appointed to fill his place on the committee.

Mr. CARTWRIGHT, in acknowledging the vote of thanks, said his duties on the committee had never been very onerous, but they had always been pleasant and agreeable, and were cheerfully placed at the disposal of the adventurers. One of the hardest things he had had to do was to sign cheques for the payment of dividends—(hear, and laughter)—and that was always so extremely agreeable that he thought the obligation was on his side, and not on theirs. During the nine years that he had been in the county he had met with a great many kind friends, and he hoped he should meet with as many in that part of the country where his lot for the future was to be cast.

Capt. JOSHUA THOMAS, in answer to a question, said he thought he might state without the slightest fear that the mine never looked so well as at the present moment. They had begun to sink the engine-shaft again under the 326, and there was a lode in the shaft which would produce something like 3 tons of tin per fathom. The bottom end, driving east of the shaft, would produce fully 2 tons of tin per fathom, and there was as fine a lode in the bottom of the mine as he had ever seen in any part of it. With regard to the accounts, he thought they had great reason to congratulate themselves that they were in so good a state, seeing the adverse circumstances they had passed through. At one time within the last three months matters looked rather gloomy, as tin was constantly falling, and within that time it went down altogether 70 per ton, while the average price per ton during the quarter was 40, 2s. 6d. less than in the preceding three months, making a difference in their credits of about 12000. In the face of all this they were still able to pay the same dividend as last time. This was a matter of great congratulation, but it could not have been done unless Dolcoath had been a very good mine. As he had already said, it was looking remarkably well, and besides this their costs were nearly 10000 less than last quarter. He did not, however, see how they could reduce the costs below the present figure if the mine was to be worked in a proper manner, and he certainly should not advise a further reduction. It seemed to him to be almost a pity to raise so much tin as they were at present raising at so small a profit, and if the property were his own he could possibly do without it he would not attempt to make profits at present prices. But they had a large constituency to consult, and he supposed the adventurers at large would not like to see the good old mine go off the Dividend List, even for a brief period. Therefore, he did not see that they could do better than they were doing now. From the information he could obtain from various sources he believed they would shortly see a further increase in the price of tin. The consumption was very large, and as the general trade of the country improved they might also expect a revival of the tin trade. An increased standard would be sure to be followed by increased dividends. A vote of thanks to the Chairman closed the meeting.—Western Daily Mercury.

WHEAL OWLES.—At a meeting of adventurers held at the mine, on Aug. 27, the accounts showed a debit balance of 16,536, 13s. 6d.—Work performed during the quarter: 181 fms. 4 ft. 9 in. driven in levels, and 43 fms. 5 ft. 11 in. sunk in winzes; 23 pans stopping for tin on tutwork; 20 pitches working on tribute. They have considerably increased their stock of tin since last account.

COOK'S KITCHEN.—At the meeting last week Mr. W. H. Rule drew attention to the matter of the coal supply of the mine, pointing out that by hiring a steamer at the rate of 2400, a month, allowing 1000 per week for extra expenses, and importing their own coal, say 3000 tons, they would save 2500, by freights alone, whilst the saving in every other way would be of the greatest importance to such a mine as this.—Capt. Thomas said he could get no freights lower than 6s. per ton, whereupon Mr. Rule offered to carry for him 2000 tons per month at 5s. 6d. per ton freight.—The purser pointed out that in 1870, 1871, and 1872 the mine had 20,0000; they had only called back 30000, and so there was yet a good balance on the right side.

POWELL'S LANTWIT COLLIERIES.—At the adjourned general meeting, on Aug. 27, the directors' report and accounts for the year 1874, were unanimously adopted.

For remainder of Meetings see to-day's Journal.]

FOREIGN MINING AND METALLURGY.

Business in copper at Paris has been very restricted; prices have, nevertheless, exhibited great firmness, and Chilian bars have been advancing. Chilian bars, delivered at Havre, has made 87l. 8s. per ton; ditto ordinary descriptions, 86l. 8s.; ditto in ingots, 91l. 4s.; English tough cake, 89l.; and pure Corocoro minerals, 87l. per ton. There has been little business in copper at Havre, but the Marseilles copper market has been very firm. The German copper markets have also been firm, without much change in prices. A rather sudden rise has occurred in tin at Rotterdam; for disposable Banca it has been necessary to pay 52 fl. Disposable Billiton has advanced from 48 fl. to 50 fl.; for delivery in November the rate paid has been 49 fl. Upon these conditions, transactions have been restricted to the most urgent requirements of consumption. Prices of tin have improved at Paris, but business has remained in a very quiet state. There has been rather more animation observable upon the German tin markets. Lead has been generally firm. French lead, delivered at Paris, has made 23l.; Spanish, delivered at Havre, 22l. 16s.; and English ditto, 23l. per ton. Lead has been very well supported upon the German markets. Business has presented no great animation in zinc at Paris; Silesian, delivered at Havre, has made 25l. 12s.; and other good marks, delivered at Havre or Paris, 25l. 4s. per ton. Zinc has not given rise to large transactions in Germany; at the same time, prices have remained very firm.

The aspect of the French iron trade is not very encouraging. The imports of pig and iron into France have increased this year to the extent of 22,000 tons, or about 22 per cent., as compared with the corresponding period of 1874. The increase has occurred wholly under the head of pig, which was imported to July 31 this year to the extent of 96,000 tons. The exports of pig and iron from France in the first seven months of this year present a reduction of 26 per cent. Prices have remained low, and have left comparatively little profit. The average prices paid by French railway companies for steel and iron rails in June were—for steel rails 12l. per ton, and for iron rails 7l. 12s. per ton. The production of pig and iron appears to be increasing in France. Comparing the first half of 1875 with the first half of 1874, the production of pig exhibits an advance of more than 1700 tons, while that of iron and steel shows an augmentation of more than 31,000 tons. Upon the whole, the situation may be summed up as follows:—Little business, much production, falling prices, accumulating stocks. The rolling mills are working, but only to meet current requirements, without strength or durability. Rails are in no great demand. There is also comparatively little business in pig, as well as refining as casting; the first is dealt in in the eastern departments at 2l. 16s. per ton, and even less.

The last meeting of the Brussels Metallurgical Bourse did not result in the transaction of much business, affairs remaining in a languishing state. An adjudication for the renewal of the iron to be taken from the Belgian State lines in 1876 is to take place on Sept. 8; it is hoped that this contract will afford employment to some establishments which are now greatly in need of it. The manufacture of rails continues to suffer in Belgium from a lack of important orders; there is, indeed, a growing impression that the productive metallurgical resources of the world now exceed the iron requirements of the leading civilised countries; any such idea must, however, be necessarily vague. The only definite fact available is that the extent of railway in operation in the world is now about 160,000 miles, of which upwards of 150,000 miles are situated in Europe and America.

A contract for coal for the Belgian State Railways has been let this week. A considerable number of tenders were sent in, and the whole affair was keenly disputed. Prices have presented a slightly downward tendency. As the extraction of coal has been reduced in Belgium stocks are not increasing, and transactions are almost nil. The Eastern of France Railway Company has made arrangements for a supply of the briquettes required for its consumption throughout 1876 at 15s. to 15s. 6d. per ton. A strike of short duration has occurred at the Artistes Colliery at Flémalle-Grande.

The aspect of the coal trade in France is tolerably good; the approach of the winter season is already exercising a favourable influence on affairs. Stocks are being attacked in some localities; these stocks had accumulated during the summer, which is just ending, and they had occasioned a certain amount of embarrassment, but now a period of steady regular work is anticipated, when consumption will equal, if it does not exceed, production. The Pas-de-Calais and the Nord are more favoured than the basin of the Loire, because these two departments are more independent of metallurgy. In Germany the general position of the coal trade is less favourable than in France; the Sarrebruck basin, for instance, exhibits some feebleness in the extremely important matter of prices.

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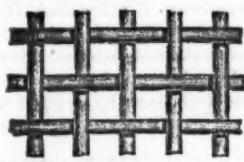
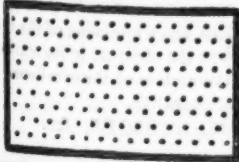
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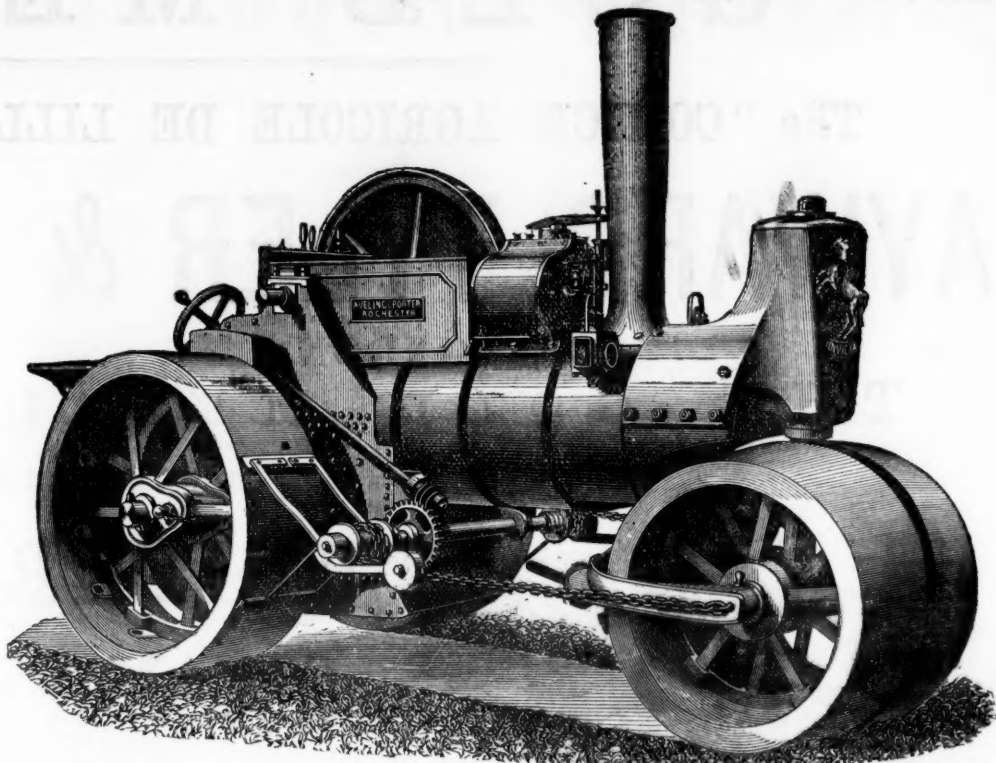
W. H. WILTON begs to thank his friends for their liberal support for so many years, and informs them that (having opened business at Valparaiso) he has now declined business in England in favour solely of Mr. A. JEFFERY, MATHEMATICAL INSTRUMENT MAKER, CAMBORNE, whom he considers (having been an assistant to his father for several years) is in every way capable of creditably maintaining the good name universally awarded to Wilton's instruments.

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The above engraving represents one of A. Velding and Porter's Steam Road Rollers, which has recently been introduced by them in order to obtain a steam roller the first cost of which and expense of working shall be less than is practicable with the type of machine first manufactured by them in 1865.

The utility of road rolling is now generally appreciated, and when it is affirmed that a saving of 40 or 50 per cent. in the cost of road repairs results from the employment of steam-rollers there seems little need for prefacing the description of the rollers themselves with observations upon the economy of using them. The reason of the great saving, however, is obvious. The road being made for, and not by, the traffic, the expenditure of material is diminished, the stones, instead of being left loosely upon the surface to encounter the grinding lateral pressure of the wheels, are forced by direct vertical pressure into the bed prepared for them, along with a binding material that fills up the interstices, and affording support for the stones keeps them in position, with one surface only exposed to the abrading action of the wheels; the whole coating is consolidated, and there remains a surface hard and smooth enough to resist the disintegrating action of rain or frost.

The illustration shows that, while the general arrangement of a road locomotive engine is adhered to, the driving wheels are widened to form the side rollers, and the space between them is covered by a pair of steering rollers. The single cylinder is placed on the forward part of boiler, and is surrounded by a steam-jacket in direct communication with it; the steam is taken into the cylinder from the dome on the top of this jacket; the use of steam-pipes, either inside or outside the boiler, is thus avoided, and an important saving of fuel is effected. It will also be seen that the motion is taken by spur-gearing from the crank-shaft to the counter-shaft, and thence to the driving axle, for each of which bearings are provided in the side-plates of the fire-box, which are extended upwards and backwards in one piece for that purpose. The steering is effected from the foot-plate by a worm and pinion. The steering-rollers are made slightly conical, in order that on the ground line they may run close together, while leaving space above their axle for the vertical shaft which connects them to the engine, and which serves to support the forward part of the boiler, and at the same time play is given to the vertical shaft for the rollers to accommodate themselves to the curved surface of the road. The machine can be turned round in little more than its own length, and it can roll steep hills without injury to the fire-box, while retaining the manifold practical advantages of the horizontal over the vertical boiler for locomotive purposes, amongst which may be enumerated absence of priming, economy in fuel, wear and tear, and much lower centre of gravity. It may be also noted as important features of these rollers that they are adapted for driving stone-breakers or other fixed machinery most economically, when not required for rolling, and for use as traction engines. They are managed by one person.

Steam-rollers are now working with great success in the following among other places:—London, Edinburgh, Liverpool, Manchester, Birmingham, Leeds, Sheffield, and many other English towns, as well as in New York, Philadelphia, Chicago, Berlin, Vienna, Christiania, Stockholm, India, Canada, South America, Australia, and the West Indies. The reports of road surveyors tend to confirm the opinion as regards the economy and efficiency in road-making which has followed the use of steam-rollers. The Islington vestry say that "since the steam-roller has been used in Islington the roads have lasted twice as long without repairs as they did under the old system; and that, instead of the roads after being coated with new material being for many weeks (sometimes months) disagreeable to the rider, agonising to the horse, and very costly to the owner of the horse, the steam-roller puts the roads at once into such a condition that it is a pleasure to ride upon them."

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SAFETY FUSE, FIRE TO THE BLASTING ROCKS, &c.

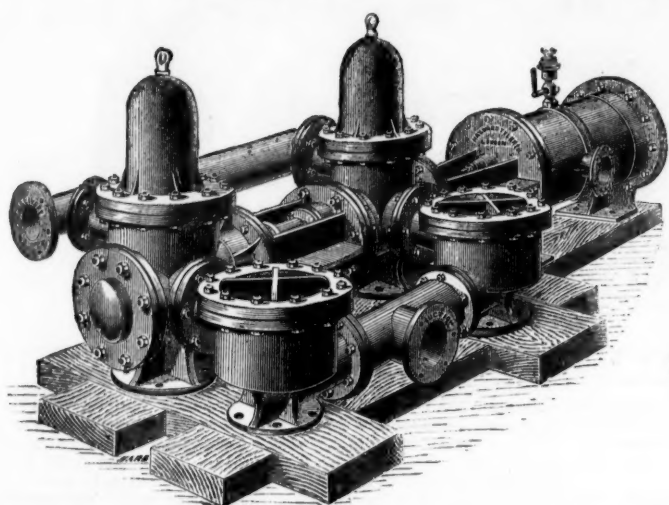
Obtained the PRIZE MEDALS at the "ROYAL EXHIBITION" of 1861; at the "INTERNATIONAL EXHIBITION" of 1862, in London; at the "IMPERIAL EXHIBITION," held in Paris, in 1865; at the "INTERNATIONAL EXHIBITION," in Dublin, 1865; at the "UNIVERSAL EXHIBITION," in Paris, 1867; at the "GREAT INDUSTRIAL EXHIBITION," at Altona, in 1869; and at the "UNIVERSAL EXHIBITION," Vienna, in 1873.



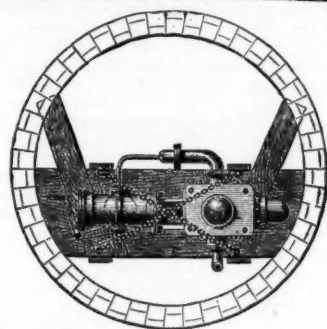
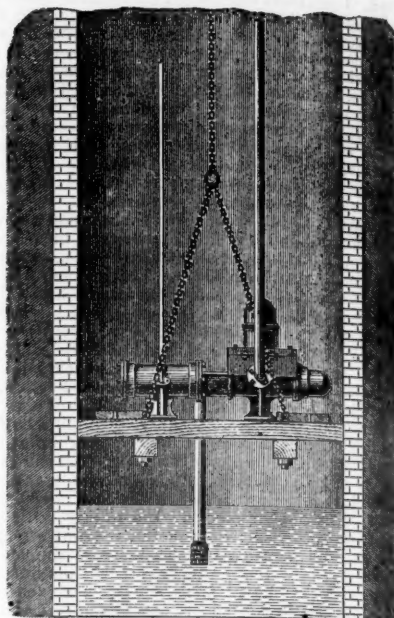
BICKFORD, SMITH, AND CO., of TUCKINGMILL, CORNWALL; ADELPHI BANK CHAMBERS, SOUTH JOHN STREET, LIVERPOOL; and 85, GRACECHURCH STREET, LONDON, E.C., MANUFACTURERS AND ORIGINAL PATENTERS OF SAFETY-FUSE, having been informed that the name of their firm has been attached to fuse not of their manufacture, beg to call the attention of the trade and public to the following announcement:—EVERY COIL OF FUSE MANUFACTURED BY THEM HAS TWO SEPARATE THREADS PASSING THROUGH THE COLUMN OF GUNPOWDER, AND BICKFORD, SMITH, AND CO. CLAIM TWO SUCH SEPARATE THREADS as THEIR TRADE MARK.

GOLD MEDAL.

The "COMICE AGRICOLE DE LILLE" have awarded to
HAYWARD TYLER & CO.,
 OF LONDON,
THE GOLD MEDAL



FOR THEIR PATENT
"UNIVERSAL"
STEAM PUMP,
 IN AN
OPEN COMPETITION,
HELD AUGUST, 1874.



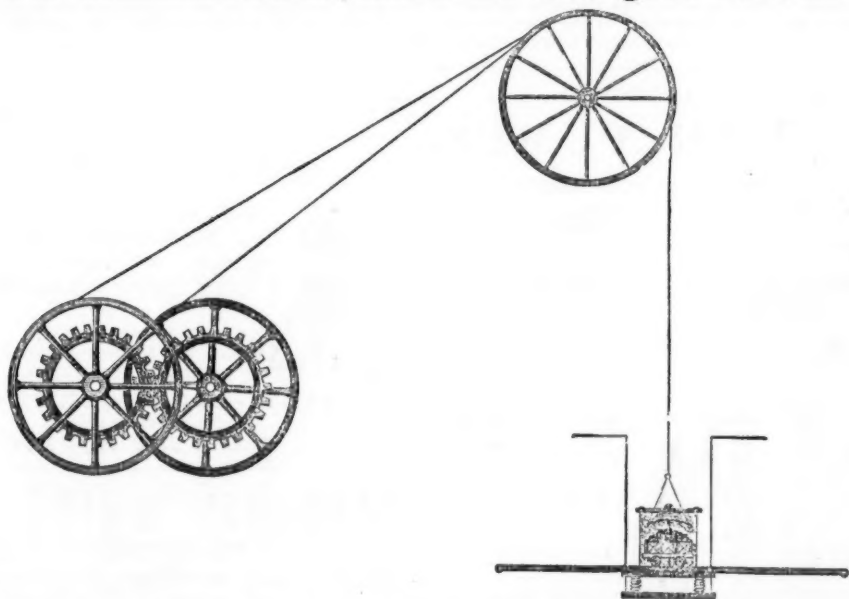
Silver Medal: Royal Cornwall Polytechnic Society, 1872.

Medal for Progress: Vienna Exhibition, 1873.

SPECIALLY ADAPTED FOR MINING AND GENERAL PURPOSES.

84 AND 85, UPPER WHITECROSS STREET, LONDON.

WILSON'S PATENT WINDING GEAR,
 For Collieries, Mines, and other analogous Purposes.



The ADVANTAGES of this Patent is to ECONOMISE the WEAR and TEAR of the ROPES and MACHINERY used in drawing or lowering weights in Mines, or any other similar purposes.

At a mere nominal cost this patent can be applied to any or every Mine now in operation, while its application to any new plant will scarcely make any difference in time or cost.

Applications for Licence to use the said Invention can be made to the Patentee,—

R. WILSON, PHENIX WORKS, ROTHERHAM.

Full particulars on application can be had as to terms, drawings, &c., &c.

Coal-Getting by Patent Hand-Worked Machinery,
 WITHOUT THE USE OF GUNPOWDER.

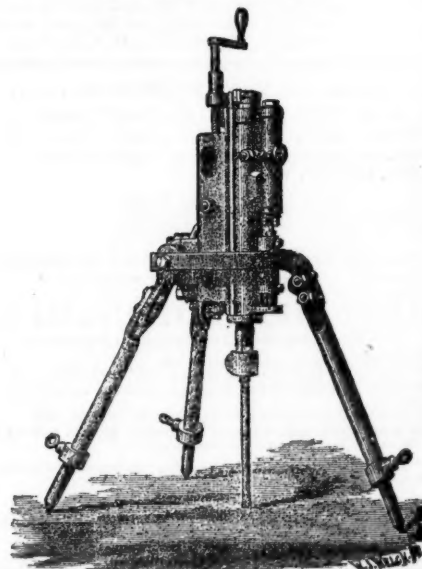
- No. 1 MACHINE - THE HAND COAL-CUTTER, for under-cutting.
 2 " - THE ROCK & COAL PERFORATOR, for drilling.
 3 " - THE SCREW WEDGE, for breaking down.

The use of these Machines, while doing away with the greatest source of danger, economises at least Fifty per cent. of the labour required in Getting Coal.

Particulars on application to—

MARTIN MACDERMOTT,
SCOTT'S CHAMBERS, PUDDING LANE, LONDON, E.C.

THE "CHAMPION" ROCK BORER,
 For Tunnels, Mines, Quarries
 AND OTHER WORKS.



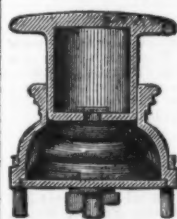
The "CHAMPION" Rock Borer has been designed after years of experience of other Rock Drills; it surpasses them in their good qualities, and avoids their imperfections, and while being of the very best make and material, it is absolutely the cheapest in the market.

Intending purchasers can satisfy themselves of the excellence of this Rock Borer by seeing it in actual operation.

IMPROVED AIR COMPRESSORS, &c.

ULLATHORNE & CO.,
 No. 56, METROPOLITAN BUILDINGS, QUEEN
 VICTORIA STREET, LONDON, E.C.

THOMAS TURTON AND SONS,



MANUFACTURERS OF
 CAST STEEL for PUNCHES, TAPS, and DIES
 TURNING TOOLS, CHISELS, &c.
 CAST STEEL PISTON RODS, CRANK PINS, CON
 NECTING RODS, STRAIGHT and CRANK
 AXLES, SHAFTS and
 FORGINGS of EVERY DESCRIPTION.
 DOUBLE SHEAR STEEL T. FILES MARKED
 BLISTER STEEL, T. TURTON
 SPRING STEEL, EDGE TOOLS MARKED
 GERMAN STEEL, WM. GREAVES & SON
 Locomotive Engine, Railway Carriage and Wagon
 Springs and Buffers.

SHEAF WORKS AND SPRING WORKS, SHEFFIELD.
 LONDON WAREHOUSE, 35, QUEEN STREET, CANNON STREET, CITY, E.C.
 Where the largest stock of steel, files, tools, &c., may be selected from.

THE "LEVET" ROCK DRILL.

SUPERIOR TO ALL OTHERS.



COPY OF TESTIMONIAL FROM THE ENGINEER, BLANZY MINES, FRANCE. Feb. 25, 1875.

I hereby certify that the new Rock Drill of C. Levet's System has worked at the Blanzky Mines since Nov. 20 without there being the slightest necessity for repair. Its results up to this date have been superior to the other Rock Drills employed in the said mines.

(Signed)
THE ENGINEER OF THE MINES, POUZANCAU.

THE SACCHARUM WORKS, SOUTHAMPTON.
ANGLO-BAVARIAN BREWERY.

GENTLEMEN,—We have much pleasure in stating that the "STANDARD" Steam Pumps supplied to us for these works, and for our Brewery at Shepton Mallet, give us entire satisfaction. The two first we had from you have been in use for 12 months, and they are still in good working order. THEY ARE ENTIRELY FREE FROM THE NOISE IN WORKING WHICH ALL OTHER STEAM PUMPS WE HAVE TRIED ARE SUBJECT TO; they throw a large quantity of liquor fully equal to the amount named in your Circular, and we can confidently recommend them in preference to any other pumps we have used.

(Signed)

Yours truly,
HILL, GARTON, AND CO.



FOR PARTICULARS OF
ROCK DRILLS, AIR COMPRESSORS, COAL CUTTERS, "STANDARD" PUMPS,
AND ALL OTHER MINING MACHINERY, APPLY TO

CHARLES HARWOOD & CO.,

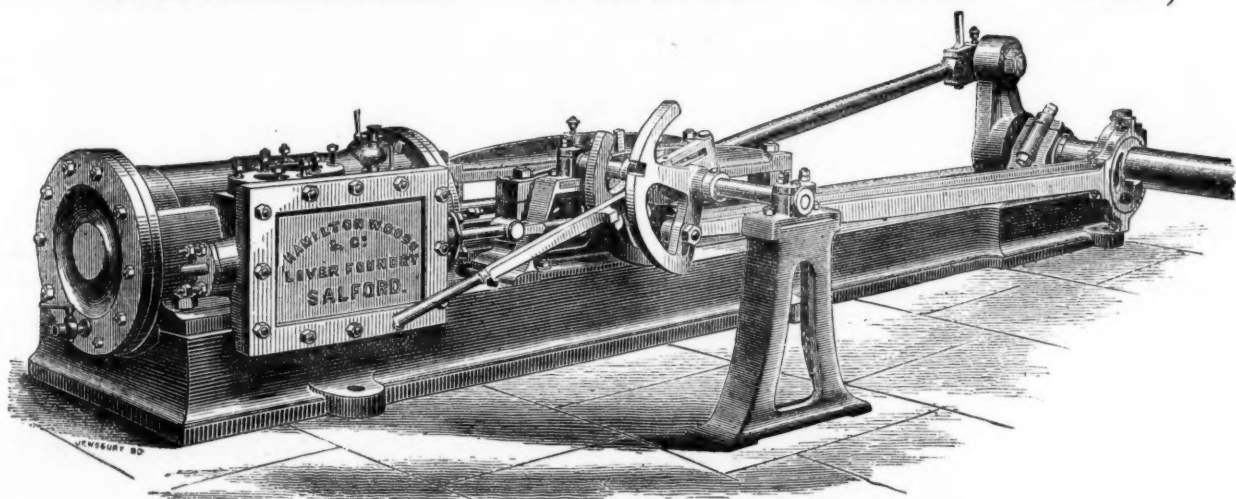
St. Stephen's Chambers, Telegraph-street, Moorgate-street,
LONDON, E.C.

GEORGE ANGUS AND COMPANY,

ST. JOHN'S LEATHER AND INDIA-RUBBER WORKS,
NEWCASTLE-UPON-TYNE.

Every description of Leather, India-rubber, and Gutta-percha for Engineering and General Mechanical purposes.

HAMILTON WOODS AND CO.,

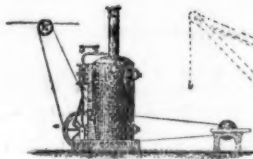


Makers of Hauling & Winding Engines, Direct cut-off Expansion Engines, & Compound Engines.
High-pressure Engines, Vertical and Horizontal, from 3 to 20 h.p.,
ALWAYS IN STOCK, OR IN PROGRESS.

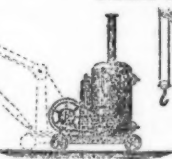
LIVER FOUNDRY, ORDSALL LANE, SALFORD, MANCHESTER.

CHAPLIN'S PATENT PORTABLE STEAM ENGINES AND BOILERS.

PRIZE MEDAL, INTERNATIONAL EXHIBITION, 1862.



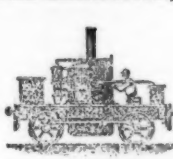
STATIONARY ENGINES,
From 1 to 50-horse power.
No building required.



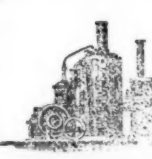
PORTABLE ENGINES,
1 to 30-horse power.
With or without jib.



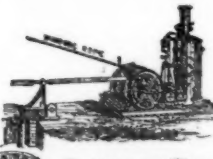
STEAM CRANES,
30 cwt. to 25 tons.
For wharf or rail.



CONTRACTORS' LOCOMOTIVE,
4 to 25-horse power.
For steep inclines and quick curves.



SHIP'S ENGINES,
Winding, Hoisting, and Distilling.
Passed by Government for half water.



PUMPING AND WINDING
ENGINES, 4 to 30-horse
power.

* These cranes were selected by H.M. Commissioners to receive and send away the heavy machinery in the International Exhibition.
From the STRENGTH, SIMPLICITY, and COMPACTNESS of these ENGINES they are extensively USED for GENERAL PURPOSES, and also in situations where STEAM-ENGINES OF THE ORDINARY CONSTRUCTION CANNOT BE APPLIED.

ALEXANDER CHAPLIN AND CO.,

PATENTEES AND SOLE MANUFACTURERS,

CRANSTON HILL ENGINE WORKS, GLASGOW.

ENGINES OF EACH CLASS KEPT IN STOCK FOR SALE or HIRE, and ALL OUR MANUFACTURES GUARANTEED as to EFFICIENCY, MATERIAL, and WORKMANSHIP.

Parties are cautioned against using or purchasing imitations or infringements of these patent manufactures.
AGENTS IN LONDON FOR THE SALE OF OUR MANUFACTURES: WIMSHURST AND CO.

VARLEY & YEADON, COLLIERY & BRICK-MAKING ENGINEERS,

Manufacturers of WINDING, HAULING, and PUMPING ENGINES, Boilers and Fittings, Steam Piping, Donkey Pumps, Lift Pumps, Perforated Clay and Mortar Mills, Brick Presses, Pug Mills, Round and Flat Rope, Pit-head Pulleys, Wrought-iron Head Gear, ROOFS and GIRDERS, Kibbles, ONE, TWO, and THREE-DECK CAGES, COAL TIPPING and SCREENING APPARATUS, VENTILATING FANS, TUBBING, GIRDERS, PILLARS, POINT PLATES, Steam or other Cranes, Crabs and Windlasses, Machines for Cutting Stone, &c.

CROWN POINT FOUNDRY, LEEDS.

Estimates furnished on application.

COPPER COKE OVENS

Complete information respecting these
PATENT COKE OVENS

may be obtained from the

COPPER COKE COMPANY
(LIMITED),

94, GRACECHURCH STREET, LONDON, E.C.

Ore Crushers, with H.R.M.'s New Patent Crushing Jaw.

EXTENSIVELY USED BY
MINE OWNERS.

Few Working Parts.
Small Wear and Tear.
Freedom from Breakage.
Simplicity of Construction.
Excellence of Sample.
Economy of Power.

ALSO,

ROAD METAL-MAKING MACHINES,

WITH

H.R.M.'s New Patent Cubing Jaw.

FOR

REDUCING THE MATERIAL

TO

ANY REQUIRED SIZE.

EXCLUSIVELY ADOPTED BY HER
MAJESTY'S GOVERNMENT.



H.R. MARSDEN, LEEDS,

ENGINEER,

Immense Saving of Labour.

Mining Improvements, Revolving Picking Table.

950 NOW IN USE.

AWARDED 45 GOLD AND SILVER MEDALS.

By the PATENT MACHINE

HERE ILLUSTRATED

60 to 70 Tons of Ore

MAY BE

CRUSHED OR SEPARATED

PER DAY OF TEN HOURS.

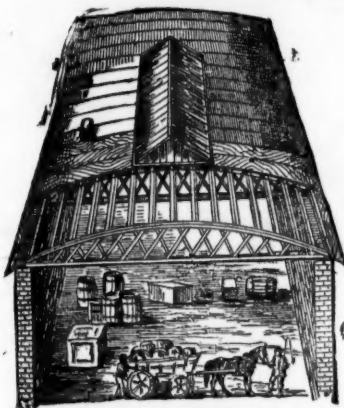
EXTRACT FROM TESTIMONIALS:

"Although I have travelled hundreds of miles for the purpose of, and spent several days in, examining what are styled ORE CRUSHERS, yours only embrace and combine the true principles of action and construction for the purpose designed."

CATALOGUES FREE on application to

H. R. MARSDEN,
Patentee and Sole Maker,
LEEDS.

M'TEAR AND CO.'S CIRCULAR FELT ROOFING,



FOR
GREAT ECONOMY
AND
CLEAR WIDE SPACE.

For particulars, estimates,
and plans, address,—

M'TEAR & CO.,
ST. BENET CHAMBERS,
FENCHURCH STREET,
LONDON, E.C.;
4, PORTLAND STREET,
MANCHESTER;
OR
CORPORATION STREET,
BELFAST.

The above drawing shows the construction of this cheap and handsome roof, now much used for covering factories, stores, sheds farm buildings, &c., the principal of which are double bow and string girders of best pine timber, sheeted with $\frac{1}{4}$ in. boards, supported on the girders by pulleys running longitudinally, the whole being covered with patent waterproof roofing felt. These roofs so combine lightness with strength that they can be constructed up to 100 ft. span without centre supports, thus not only affording a clear wide space, but effecting a great saving both in the cost of roof and uprights.

They can be made with or without top-lights, ventilators, &c. Felt roofs of any description executed in accordance with plans. Prices for plain roofs from 30s. to 80s. per square, according to span, size, and situation.

Manufacturers of PATENT FELTED SHEATHING, for covering ships' bottoms under copper or zinc.

INDOROUS FELT for lining damp walls and under floor cloths.

DRY HAIR FELT, for deadening sound and for covering steam pipes, thereby saving 25 per cent. in fuel by preventing the radiation of heat.

PATENT ASPHALTE ROOFING FELT, price 1d. per square foot.

Wholesale buyers and exporters allowed liberal discounts.

PATENT ROOFING VARNISH, in boxes from 3 gallons to any quantity required 8d. per gallon.



By a special method of preparation, this leather is made solid, perfectly close in texture, and impervious to water; it has, therefore, all the qualifications essential for pump buckets, and is the most durable material of which they can be made. It may be had of all dealers in leather, and of—

I. AND T. HEPBURN AND SONS,
ANNERS AND CURRIERS, LEATHER MILLBAND AND HOSE PIPE
MANUFACTURERS,
LONG LANE, SOUTHWARK, LONDON
Prize Medals, 1851, 1855, 1862, for
MILL BANDS, HOSE, AND LEATHER FOR MACHINERY PURPOSES.

THE GREAT ADVERTISING MEDIUM FOR WALES.
THE SOUTH WALES EVENING TELEGRAM
(DAILY), and
SOUTH WALES GAZETTE
(WEEKLY), established 1857,
the largest and most widely circulated papers in Monmouthshire and South Wales
CHIEF OFFICES—NEWPORT, MON.; and at CARDIFF.

The "Evening Telegram" is published daily, the first edition at Three P.M., the second edition at Five P.M. On Friday, the "Telegram" is combined with the "South Wales Weekly Gazette," and advertisements ordered for not less than six consecutive insertions will be inserted at a uniform charge in both papers.

P. O. O. and cheques payable to Henry Russell Evans, 14, Commercial-street Newport, Monmouthshire.

Just published, Free Edition.

GUIDE TO HEALTH; OR, ADVICE AND INSTRUCTIONS FOR THE CURE OF NERVOUS DEBILITY.—A New Medical Work on the Treatment of Local Debility, Consumption, Loss of Memory, Physical Depression, Indigestion, and all diseases resulting from loss of nerve power. Illustrated with cases and testimonials. Sent free for two stamps.—Dr. SMITH will, for the benefit of country patients, on receiving a description of their case, send a confidential letter of advice.—Address, Dr. H. SMITH, 8 Burton-crescent London, W.C.

J. WOOD ASTON AND CO., STOURBRIDGE

(WORKS AND OFFICES ADJOINING CRADLEY STATION),

Manufacturers of

CRANE, INCLINE, AND PIT CHAINS,

Also CHAIN CABLES, ANCHORS, and RIGGING CHAINS, IRON and STEEL SHOVELS, SPADES and FORKS, ANVILS, VICES, SCYTHES, HAY and CHAFF KNIVES, PICKS, HAMMERS, NAILS, RAILWAY and MINING TOOLS, FRYING PANS, BOWLS, LADLES, &c., &c.

Crab Winches, Pulley and Snatch Blocks, Screw and Lifting Jacks, Ship Knees, Forgings, and Use Iron of all descriptions, STOURBRIDGE FIRE BRICKS AND CLAY.

ARTESIAN BORINGS,

For WATER SUPPLY to TOWNS, LAND IRRIGATION, and MINERAL EXPLORATIONS, may be executed of any diameter, from 6 in. to 36 in., and to any depth to 2000 ft.,

Pistons & Air-pump Buckets fitted with Patent Elastic Metallic Packing of which upwards of 8684 have been made to March, 1875.

MATHER AND PLATT,

MAKERS OF LARGE PUMPS AND PUMPING ENGINES.

Improved Valves and Taps for Water, Steam, Gas, &c.

PATENT STEAM EARTH-BORING MACHINE

ENGINEERS and MACHINE MAKERS to CALICO PRINTERS, BLEACHERS, DYERS, and FINISHERS.

SALFORD IRONWORKS, MANCHESTER.

PRICES AND PARTICULARS ON APPLICATION.

IMPORTANT TO STEAM USERS.

THE BARROW SHIPBUILDING COMPANY (LIMITED), having purchased the Patents and Business of the

"HOWARD SAFETY BOILER,"

Desire to call the attention of Steam Users to some important improvements recently introduced in these Boilers, by which any points of objection to previous designs are entirely overcome, whilst the valuable principle, so widely recognised, is retained.

In the improved Boiler there is neither welding or screwing, and the whole of the interior is readily exposed to view and cleaned out. The more simple construction of the improved Boilers admits also of a substantial reduction in price.

Twenty of the Howard Safety Boilers, of 60-horse power each, are in use at Barrow, and altogether about 800 are successfully at work. The Boilers may also be seen at work at Messrs. J. and F. Howard's, Britannia Ironworks, Bedford.

FOR PARTICULARS, APPLY TO

THE BARROW SHIPBUILDING COMPANY, LIMITED,
BARROW-IN-FURNESS, LANCASHIRE;

4, CHEAPSIDE, LONDON (three doors from St. Paul's); and 43, MARKET STREET, MANCHESTER.

THOMAS WARDEN & SON, IRON, STEEL, AND GENERAL MERCHANTS, LIONEL STREET, BIRMINGHAM,

Manufacturers of Anvils, Vices, Hammers, Bellows, Ties Irons, Hydraulic and Screw Jacks, Crabs, Cranes, Spades, Shovels, Picks, Arms and Boxes, Axles, Springs, Hurdles and Fencing, Screw Bolts, Washers, Hames, Chains, Files, Nails, &c., &c.

SECOND-HAND RAILS, AND EVERY DESCRIPTION OF RAILWAY, COLLIERY, AND CONTRACTORS PLANT ALWAYS ON HAND.